UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IX

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| IN THE MATTER OF: | THIRD MODIFICATION TO THE ADMINISTRATIVE ABATEMENT ACTION OF JULY 19, 2000 |
| LEVIATHAN MINE<br>ALPINE COUNTY, CALIFORNIA | U.S. EPA Region IX<br>CERCLA<br>Docket No. 2003-15 |
| REGIONAL WATER QUALITY CONTROL BOARD, LAHONTAN REGION, STATE OF CALIFORNIA | Proceeding under Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. § 9606(a). |

## I. INTRODUCTION AND JURISDICTION

1. On July 19, 2000, the United States Environmental Agency, Region IX ("EPA") issued an Administrative Abatement Action ("Administrative Action") which provided for the performance by the California Regional Water Quality Control Board, Lahontan Region (the "LRWQCB") of a Removal Action described in the Removal Action Memorandum dated July 19, 2000 ("2000 RAM") for certain property located in Alpine County, California known as the Leviathan Mine (the "Site"). This Administrative Action was issued pursuant to the authority vested in the President of the United States by section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9606(a) as amended ("CERCLA"), and delegated to the Administrator of the United States Environmental Protection Agency ("EPA") by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, as amended by Executive Order No. 13016, August 30, 1996, 61 Federal Register 45871, further delegated to the EPA Regional Administrators by EPA Delegation Nos. 14-B and further redelegated by Regional Delegations dated September 29, 1997.

2. Paragraph 67 of the Administrative Action provides that the Director of the EPA Superfund Division has authority to modify the Administrative Action

3 In the Modification to the Administrative Action of July 19, 2000, dated July 5, 2001 ("2001 Modification"), EPA modified the Administrative Action pursuant to Paragraph 67 to add a requirement that the LRWQCB also perform a Removal Action at the Site described in the Removal Action Memorandum dated July 5, 2001 ("2001 RAM").

4. In the Second Modification to the Administrative Action of July 19, 2000, dated July 11, 2002 ("Second Modification"), EPA modified the Administrative Action pursuant to Paragraph 67 to add a requirement that the LRWQCB also perform an additional Removal Action at the Site described in the Removal Action Memorandum dated July 11, 2002 (' 2002 RAM")

5. To date, the LRWQCB has performed the work required by the Administrative Action, as modified At this time, EPA and the LRWQCB agree that current circumstances require certain additional changes in the work to be performed, which will be stated in a new Removal Action Memorandum and Work Plans to be submitted thereunder For that reason, EPA is issuing this Third Modification to the Administrative Abatement Action of July 19, 2000, to expand the scope of work to be performed to include performance of the new Removal Action Memorandum ("2003 RAM"). This Modification is issued pursuant to paragraph 67 of the Administrative Action, as well as section 106(a) of CERCLA, 42 U.S C. § 9606(a)

## II. FINDINGS OF FACT

6 The Findings of Fact stated in the Administrative Action, the 2001 Modification and the 2002 Modification are incorporated herein by reference, and EPA further finds the following additional facts

7 Actions taken by the LRWQCB during the last year pursuant to the Administrative Action and 2002 Modification prevented Acid Mine Drainage (AMD) from flowing out of the

storage ponds on-site this year. However, because of ongoing intake into the evaporation ponds, further treatment of AMD in the ponds is necessary to prevent overflows of concentrated AMD from the ponds into Leviathan Creek in the spring of 2004.

8. The decision by EPA on the Removal Action to be implemented by the LRWQCB at the Site this year is embodied in a Removal Action Memorandum, executed in July of 2003 ("2003 RAM"). The LRWQCB had a reasonable opportunity to review and comment on the 2003 RAM pursuant to section 106(a) of CERCLA, 42 U.S.C. § 9606(a), and 40 C.F.R. § 300.500. EPA will provide for public comment pursuant to the procedures set forth in 40 C.F.R. § 300.415(n)(2), which pertains to removal actions where less than six months exists before on-site removal activity must begin. The 2003 RAM is attached as Attachment 1 and is incorporated by reference. The 2003 RAM is supported by an Administrative Record that includes the documents and information upon which EPA based the selection of the Removal Action.

## III. CONCLUSIONS OF LAW AND DETERMINATIONS

9. The Conclusions of Law and Determinations stated in the Administrative Action are incorporated herein by reference, and EPA further makes the following Conclusions of Law and Determinations.

10. The hazardous substances contained in the evaporation ponds continue to threaten to be released from the Site into the surface water in the future.

11. The conditions at the Site described in the Findings of Fact above constitute an actual or threatened "release" as defined in section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

12. The actual or threatened release of one or more hazardous substances from the facility may present an imminent and substantial endangerment to the public health or welfare or the environment.

13. The Removal Action required by this Administrative Action is necessary to protect the public health, welfare, and the environment, and is consistent with the National Contingency Plan and CERCLA.

## III. MODIFICATIONS

14. The provisions of the Administrative Action are to continue in full effect, except that the following modifications shall be incorporated into the Administrative Action. These modifications do not diminish the rights or responsibilities of the LRWQCB under the Administrative Action as issued on July 19, 2000 and modified on July 5, 2001 and July 11, 2002.

15. The term "Removal Action Memorandum" shall mean

a. the 2000 RAM, and all attachments thereto;

b. the 2001 RAM, and all attachments thereto;

c. the 2002 RAM, and all attachments thereto; and

d. the 2003 RAM, and all attachments thereto.

16. The term "Work" shall mean all activities the LRWQCB is required to perform under the Administrative Action as modified, including

a. any work remaining to be performed to complete the Removal Action identified by the 2000 RAM, if any;

b. any work remaining to be performed to complete the Removal Action identified by the 2001 RAM, if any;

c. any work remaining to be performed to complete the Removal Action identified by the 2002 RAM, if any; and

d. all work required for the Removal Action identified by 2003 RAM; and

e. any activities required to be undertaken pursuant to Sections IX, XII, XIII, XIV, XVIII, XIX, XX, XXI, and XXIII of the Administrative Action;

however, no work shall be required under removal action memoranda signed prior to 2003 that has not been incorporated into the 2003 RAM, unless EPA identifies such work to the LRWQCB

in writing by September 1, 2003. All work shall be performed in accordance with the provisions of Sections IX, XII, XIII, XIV, XVIII, XIX, XX, XXI, and XXIII of the Administrative Action.

BY: Keith Takata DATE: 7-25-02

Keith Takata
Director, Superfund Division
U.S. Environmental Protection Agency

Attachment 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

MEMORANDUM

DATE: July 24, 2003

SUBJECT: Request for Approval of Removal Action at the Leviathan Mine, Alpine County, CA

FROM: Kevin Mayer, RPM, Site Cleanup Branch Deleted Or Kevin Mayer

TO: Keith Takata, Director, Superfund Division

## I. PURPOSE

The purpose of this Removal Action Memo (RAM) is to request and document approval of the proposed removal action described herein for the Leviathan Mine Site, located in Alpine County, CA. This removal action will be conducted by the Lahontan Regional Water Quality Control Board (LRWQCB). This site has been the subject of five earlier removal action memoranda, dated September 24, 1997, July 19, 2000, July 5, 2001, July 27, 2001, and July 11, 2002. Three of these earlier removals were conducted by the LRWQCB. The July 27, 2001 RAM was issued for activities undertaken by ARCO Environmental Remediation L.L.C. (AERL or Atlantic Richfield) on behalf of Atlantic Richfield Company that are continuing through the current year. AERL removal actions include close coordination with concurrent removal actions including the proposed removal action described in this RAM.

Conditions presently exist at the site which, if not addressed by implementing the response action documented in this action memorandum, may lead to off-site migration and release of hazardous substances which may pose an imminent and substantial endangerment to the public health or welfare or the environment.

The actions described herein meet the criteria for a removal action under section 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

## II. SITE CONDITIONS AND BACKGROUND

Site Status: NPL
Category of Removal: Time-Critical
CERCLIS ID: CAD 980673685
SITE ID: 1A

### A. Site Description

#### 1. Removal Site evaluation

There are several sources of Acid Mine Drainage (AMD) at the Site which impact Leviathan Creek. When a release from the Site occurs, it flows through the Leviathan Creek/ Bryant Creek watershed, which drains into the East Fork Carson River. The AMD released contains elevated concentrations of metals, most notably arsenic, and also includes iron, aluminum, chromium, cobalt, copper, nickel, and zinc. The low pH and high metals content of the AMD have eliminated most aquatic life in Leviathan Creek downstream of the mine. These releases originate in the state of California and, if not addressed, could flow into the state of Nevada through Washoe Tribal lands into the East Fork Carson River, which serves as a major source of water supplies and a habitat for fish, including an historical habitat for the federally-listed threatened Lahontan cutthroat trout.

Mining ceased at the Site around 1962, and in 1984, the State of California acquired the Site to pursue cleanup and abatement of the water quality problems associated with historic mining. Jurisdiction over the Site rests with the State Water Resources Control Board which, in turn, has delegated authority over the Site to the Lahontan Regional Water Quality Control Board (LRWQCB). In an attempt to mitigate releases of AMD, the LRWQCB constructed 5 lined evaporation ponds on-site in 1983-1985, which collect AMD from on-site sources throughout the year. During the dry summer season, evaporation decreases the total volume of AMD and concentrates the contaminants within these ponds. In some past years, the combined flow of AMD and direct precipitation (rain and snow) into the ponds exceeded evaporation losses from the ponds, so that the ponds reached capacity (approximately 16 million gallons) and then overflowed into Leviathan Creek. In the past four years, LRWQCB actions prevented such overflow. However, overflow conditions may occur again unless action is taken to create additional capacity in the ponds. Estimates of the potential overflow range from 3 to 9 million gallons per year.

2. Physical location

The 656 acre Leviathan Mine property (Figure 1 in the 2000 Action Memo) lies within a remote portion of northeastern Alpine County, California, on the eastern flank of the central Sierra Nevada, near the California-Nevada border, approximately 25 miles southeast of Lake Tahoe, and 6 miles east of Markleeville, California. Of the total property, approximately 253 acres are disturbed by mine related activities. With the exception of approximately 21 acres of disturbance on Forest Service lands, all disturbance is on the property owned by the State of California. As identified on the Topaz Lake and Mt. Siegel U.S. Geological Survey (USGS) quadrangle sheets, the mine property is situated principally within Sections 15 and 22, Township 10 North, Range 21 East, although small portions of the workings extend into the southeastern and northwestern corners of the adjoining Sections 14 and 23, respectively.

Vehicular access to the mine is limited by snowfall which typically prevents vehicular access from mid-November through April. Vehicular access to the mine is provided by unpaved roads from State Highway 89 on the southeast and from U.S. Highway 395 south of Gardnerville, Nevada, on the northeast. The California-Nevada border lies approximately three miles northeast of the mine.

3. Site characteristics

The mine site is sparsely vegetated. Although there is some volunteer vegetation, most existing vegetation is due to localized revegetation efforts carried out by the LRWQCB. This remote mine has no potable water or power. The Site is isolated from approximately mid-November through April due to impassable road conditions, and is inaccessible to heavy equipment from as early as October to as late as July, depending on weather.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

There is a very high probability that the evaporation ponds, if untreated, will overflow during the winter and spring months each year, causing a release of AMD to Leviathan Creek. In addition to the overflow of AMD from the collection ponds, there are currently ongoing releases of AMD into Leviathan Creek from other uncontrolled sources which are not collected in the ponds. Interception and treatment of these releases are the objectives of the July 27, 2001 RAM governing work performed by the Atlantic Richfield Company.

5. NPL status

Based on an evaluation under the Hazard Ranking System, EPA proposed Leviathan Mine for the NPL on October 22, 1999 (64 FR 56992) pursuant to 40 C.F.R. § 300.425(c)(1). Following a comment period and response to comments, EPA added Leviathan Mine to the National Priorities List on May 11, 2000 (65 FR 30481).

6. Maps, pictures and other graphic representations

See Appendices to the original Action Memo dated September 24, 1997.

B. Other Actions to Date

The original Action Memo (September 24, 1997) and the Action Memo dated July 5, 2001 provide a brief summary of the history and development of the Leviathan Mine from 1863 through July, 2001. The Action Memo dated July 11, 2002 provides a summary of the removal actions that occurred through that date. Since that time, the following significant events have occurred:

The LRWQCB's treatment effort in 2002 operated for 43 days and successfully treated and discharged 3.8 million gallons of pond water. As in 2001, the ponds were completely emptied by the conclusion of the field season, other than pond 4 which was being used by Atlantic Richfield to treat other sources of AMD. More importantly, the operating conditions during 2002 were more representative of long-term remedial conditions, allowing for significant system improvements and optimization. The wide variation in contaminant concentration that made previous years' pond water treatment more difficult had been eliminated by the complete removal of all water in 2001. Consequently operations in 2002 were quite consistent and predictable. The water discharged to Leviathan Creek met the water quality standards that had been established in the Removal Action memorandum.

Throughout the past year, LRWQCB has continued its program of water quality monitoring and its efforts at revegetation within the mine pit and on waste rock areas outside the pit. Evapotranspiration from revegetated areas may reduce the volume of AMD that is generated at the Site. Sediment and dust from the soil surface may also be reduced in revegetated areas.

Also in 2002, Atlantic Richfield continued to operate the lime lagoon treatment system to neutralize AMD that had been discharging from another identified source, the Channel Underdrain. Once the LRWQCB had completed their summer operation, Atlantic Richfield was given permission to test the operation of the bi-phasic treatment system in a single-phase neutralization mode, combining the AMD flows of the Adit

Drain, the Pit Underdrain, the Channel Underdrain and the Delta Seep. Although the trial was of limited duration and during increasingly harsh autumn weather, the results were encouraging. Longer operational trials of a combined flow treatment are planned for the 2003 season, during periods before and after the LRWQCB's 2003 operation to once treat the AMD collected in the ponds so as to maximize storage capacity during the winter and spring.

Atlantic Richfield expanded and improved the biological treatment system at the Aspen Seep. This Sulfate Reducing Bioreactor originally had been designed and operated by researchers at the University of Nevada at Reno, with funding by LRWQCB. The 2002 construction was designed by University of Nevada in cooperation with Atlantic Richfield, LRWQCB and USEPA-Office of Research and Development. Most of the construction had been completed by the winter, with the remainder finished in June 2003. The first reactor cell was activated in the spring once the threat of severe freezing was past. Acclimation of the Bioreactor is expected to continue through the summer, with full operation as early as the autumn of 2003. In the interim, the University conducted a treatability trial of alternative chemical neutralization methods which also served to treat all the AMD generated at the Aspen Seep.

C. State and local authorities' roles

1. State and local actions to date

The State of California obtained title to the Leviathan Mine Site in 1984 in order to facilitate access during its efforts to address the pollution problem. LRWQCB manages the Site, and has undertaken pollution abatement projects (described in Section II.B. of the original Action Memo). In addition to the pond water treatment project, LRWQCB continues to take other action at the Site, such as revegetation efforts, researching AMD treatment methods, monitoring water quality and flow, and conducting site maintenance. There have been no substantive cleanup efforts by other state or local agencies. The State of California, the State of Nevada and the Washoe Indian Tribe of California and Nevada, as well as county and local agencies in both California and Nevada, have expressed their strong desire to see the contamination from Leviathan Mine addressed.

2. Potential for continued State/local response

In each season since 1999, LRWQCB has successfully treated the AMD in the evaporation ponds using the bi-phasic treatment method. Continued improvement, optimization and documentation of the treatment process remains an objective for use in long-term response decisions. LRWQCB has informed EPA that it has obtained funding from the California Legislature which can be used to begin treating the fluids in

the evaporation ponds, and that funding has been requested for full performance of the Work.

## III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

The threats to public health, welfare, or the environment are those identified in Section III of the Leviathan Mine Hazard Ranking System Documentation Record Review.

## IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

## V. PROPOSED ACTIONS AND ESTIMATED COSTS

### A. Proposed Actions

During 2003, LRWQCB will again use the bi-phasic system to treat between 3 and 4 million gallons of AMD that has accumulated in the ponds since the autumn of 2002. Based on the 2002 experience, the treatment of the pond water is expected to be completed in as little as three weeks of continuous operation. This will allow Atlantic Richfield to conduct a full operational trial of the combined flow treatment before and after the bi-phasic operation.

This years' bi-phasic treatment and the field trial of the combined flow treatment has several important consequences for long-term remediation decisions. A system that can reliably intercept and treat AMD year-round will be essential for addressing any contaminated water that is generated at Leviathan Mine. The harsh winter conditions and variability in climate are some of the factors that would make a relatively simple, unified treatment system attractive at the site. Trials during the summer can provide information on system configuration, treatment effectiveness and reliability and the chemical properties of the solid residuals, supporting any decisions on significant investments in a winterized treatment system.

The primary objective of this removal action will be to implement a neutralization treatment system to treat the AMD currently held in the evaporation ponds by raising the pH, reducing the dissolved concentrations of metals in the AMD, and separating the resulting solids from the water. The treated effluent will then be discharged to Leviathan Creek. The immediate reduction in the volume of AMD stored in the evaporation ponds will increase the storage capacity available. Greater storage capacity will reduce the likelihood of pond overflow during the winter of 2003 and the winter/spring of 2004. The method of treatment and the placement of sludge generated from the treatment is addressed in the LRWQCB's Work Plan for 2003 Site Work at Leviathan Mine submitted to EPA by LRWQCB on June 6, 2003 (Attachment 1(a)), as amended by the letter dated July 24, 2003 (Attachment 1(b)). Based on previous years' experience, continued improvements to the treatment process will be tried this season to optimize the efficiency and reliability of the treatment system.

The fluid currently in the evaporation ponds is a mixture of AMD and direct rain/snowfall that has entered the pond system since October, 2002. This fluid mixture represents the water quality that would be expected under long-term operations. Treatment of the AMD during 2003 will provide important operational data for assessing a potential long-term treatment option.

Other site activities, namely, site maintenance and continued monitoring, will also be conducted by LRWQCB at Leviathan Mine to respond to site conditions and the potential for AMD release.

1. Proposed action description

The major anticipated tasks that will be involved in the proposed response actions are as follows:

a. Treatment of AMD

- Development and implementation of improvements to the treatment system for increased efficiency and reliability of the bi-phasic system.
- Operation of the treatment system at volumes and for a time period sufficient to minimize or eliminate the potential for overflows of AMD.
- Documentation of the system's operation including costs.

b. Sludge storage

Any sludge produced by treatment of the AMD shall either be taken off-site to an appropriate waste disposal facility or, if placed on-site, shall be placed in a disposal area inside the Leviathan Mine pit. Prior to dewatering, the sludge will be located in the Pit

Clarifier. The Pit Clarifier provides final clarification of treated effluent from the biphasic treatment system. A perimeter berm precludes the movement of storm water runoff from adjacent areas into the Pit Clarifier. At the end of the treatment season, solids retained in the Pit Clarifier shall be dewatered via an underdrain. After drying out in the spring, dewatered sludge may either be left in the Pit Clarifier, or may be removed and buried in the floor of the open pit. Buried sludge shall be covered to prevent erosion and mobilization of the sludge. In addition, the cover shall be graded to ensure that runoff does not collect above the buried sludge and to minimize the chance for infiltration of water through the buried sludge.

c. Sampling

Environmental sampling of discharges into Leviathan Creek from the treatment system shall be performed. In addition to monitoring water quality and system performance, sampling will be performed as described in the LRWQCB's Work Plan for 2003 Site Work at Leviathan Mine, to assure that the system effluent is in conformance with the standards set forth in Table 1, below, or other standards identified in writing by EPA.

d. Monitoring

Water quality in Leviathan/Bryant Creek system, streamflow and meteorological conditions are critical measurements for assessing the desired impacts of the pond treatment. A year-round data collection program shall be documented in the Work Plan for Sampling and Analysis submitted by LRWQCB, with reporting and data management identified. In 2003, the continuous interception of the Delta Seep by Atlantic Richfield should provide the first documentation of stream water quality response to the capture and elimination of all four known sources of AMD discharges to Leviathan and Aspen Creeks.

e. Site maintenance

Planned maintenance activities for the 2003 construction season are addressed in the LRWQCB's Work Plan for 2003 Site Work at Leviathan Mine. The LRWQCB's immediate goal for Site maintenance is to ensure proper performance of existing Site structures, including: surface water conveyances, AMD collection/distribution systems, roads, fencing, and signage. In keeping with this goal, during the 2003 operating season, LRWQCB staff will remove sediment from surface water conveyances and the Leviathan Creek concrete channel, repair perimeter fencing, repair Site roads as necessary, and continue structural assessment of the Leviathan Creek channel and pipeline.

2. Contribution to long-term cleanup performance

The proposed removal action will address the imminent threat posed by the overflow of the AMD evaporation ponds caused by spring snowmelt. Long-term cleanup at the Site is being addressed in a separate process, but the information gathered pursuant to this removal action will be used in the long-term cleanup process. Furthermore, by increasing storage capacity in Ponds 1 and 2, this removal will contribute to the long-term cleanup process in that it will make available Pond 4 for use in the combined flow treatment operational trials which will be conducted by Atlantic Richfield.

Threats that will require attention prior to, or concurrent with, the start of a long - term cleanup:

The immediate threat of pond overflow that has been identified in this Action Memo will be addressed by the proposed removal action.

The extent to which the removal will go to ensure that threats are adequately abated:

The removal action will address only the immediate hazards of the evaporation pond overflow and site maintenance hazards in the year 2003-2004, and possibly in following years as specified in the Work Plan. The information that will be gathered to assess the effectiveness of the action can be used for developing future responses, including responses for the next several years and long term response actions.

3. Description of alternative technologies

The widely accepted technology for treating AMD involves neutralization of the pH. The methodology must be adapted to each site, because the mix of metals in AMD varies. At most sites, neutralization has been accomplished in a single step. The LRWQCB has demonstrated that bi-phasic neutralization can attain effluent standards that are acceptable under the current exigencies of the situation at Leviathan Mine, while reducing the quantity of high-arsenic sludge exhibiting hazardous characteristics. EPA has selected continued bi-phasic treatment for the pond water in 2003 , based on successful implementation in the previous four years and the need to confirm information from the 2002 treatment season.

Other methods of introducing alkalinity to neutralize the AMD, alternative sources of alkalinity besides lime, and various approaches to separating the precipitated solids

from the treated water are variations on the standard neutralization technology. One significant drawback to bi-phasic neutralization and other active treatment processes is the need for continuous staffing and power while the system is operating. Such treatment technologies can only operate at the Leviathan Mine site during the summer months when the site is accessible, although AMD is generated all year. Atlantic Richfield is preparing plans to investigate treatment technologies that may operate effectively without constant operator presence, particularly for other AMD releases without extensive storage capacity such as the Channel Underdrain and Delta Seep.

Another general treatment approach for AMD involves anaerobic biological reduction of sulfate to sulfide, which raises pH while removing the relatively insoluble metal sulfides. This method by itself does not appear to be applicable to the high-concentration AMD in the ponds, although operational testing has been fairly successful at the less-concentrated Aspen Seep contamination. This biological method appears to hold sufficient promise to justify additional investigation, and EPA has approved plans submitted by Atlantic Richfield to expand and improve the biological treatment system at Aspen Seep.

In the summer of 1998, ARCO attempted to draw down the ponds through an "enhanced evaporation" technology. This did not prove effective in treating sufficient volumes of AMD.

Alternatives to treating AMD have been attempted at other mines and have been proposed for Leviathan. Limiting the flow of oxygenated water into the sulfur-bearing rocks was the objective of the Creek diversion and compaction and terracing of much of the surface soils in 1985, as well as the goal of revegetation efforts. Additional minimization of AMD generation may be possible with a more complete understanding of the hydrogeology of the site. Hydraulic controls such as flooding some of the sulfur formations and recirculating AMD back into the geologic formation may be considered in the future.

Selection of long-term remediation technologies at Leviathan Mine is beyond the scope of this removal action. Complete assessment of alternative technologies for long-term remediation will be developed through the Remedial Investigation/Feasibility Study (RI/FS), considering site-specific, risk-based cleanup goals. This RI/FS is being conducted by Atlantic Richfield.

4. Applicable or relevant and appropriate requirements (ARARs)

A removal action shall, to the extent practicable, considering the exigencies of the situation (e.g., the urgency of the situation and the scope of the removal action to be performed), attain ARARs under federal or state environmental laws. 40 C.F.R.

§ 300.415 (j). Other federal and state advisories, criteria, or guidance may, as appropriate, be considered in formulating the removal action. The goals of this removal action are preliminary goals that will be modified, as necessary, as the situation changes and as more information becomes available during the RI/FS. Final long-term remediation goals will be determined during the remedy selection process as described in 40 C.F.R. § 300.340. Long-term remediation goals establish acceptable site-specific exposure levels that are protective of human health and the environment.

ARARs: Potential ARARs include the Clean Water Act, state water quality laws, RCRA requirements, the California Hazardous Waste Control Law, and state water quality laws for sludge disposal.

Water Quality in Receiving Waters. A primary adverse environmental impact from the Leviathan Mine discharges is on surface waters and the species which live in those waters. The Clean Water Act and the California Water Code contain requirements for control of discharges into surface waters. In setting the goals for any final remedy, EPA will consider whether any discharge from the mine to surface waters should comply with the water quality objectives, including those set forth in the Lahontan Regional Water Quality Control Basin Plan and the Numeric Criteria for Priority Toxic Pollutants for the State of California in 40 C.F.R. § 131.38(b)(2) (May 18, 2000).

This Removal Action will not respond to all releases of hazardous substances from the Site into Leviathan Creek. Specifically, releases of AMD from the Channel Underdrain and Delta Seep will not be addressed by this Removal Action. Pursuant to the Administrative Order dated November 22, 2000, Atlantic Richfield implemented a treatment system for the Channel Underdrain during the summer of 2001 and has resumed treatment as of June 18, 2003. Atlantic Richfield has expanded this treatment system to intercept and treat the Delta Seep. Atlantic Richfield is also preparing plans for a design and treatability study of a more elaborate system that could operate through the winter. Until the additional Removal Actions are successfully implemented year-round, the unmitigated releases will prevent reliable attainment of water quality standards in Leviathan and Bryant Creeks. During significant portions of the year streamflow originating upstream of Leviathan Mine is minimal and the water quality of Leviathan Creek may be dominated by the discharge of treated water from the early response actions and treatability studies. Thus, under all of the exigencies of the situation, it is not practicable by this Removal Action alone or in conjunction with the Removal Action implemented by Atlantic Richfield, to attain compliance with all ARARs for the water quality of receiving waters. However, as is explained in the following section of this Removal Action Memorandum, the discharge criteria for the effluent which will be released pursuant to this removal are at least as protective as the water quality standards promulgated by EPA for the State of California in 40 C.F.R. § 131.38(b)(2).

Effluent standards. The Clean Water Act regulates, among other matters, the discharge of pollutants from point sources into navigable waters of the United States. The discharge of effluent from the treatment plant at Leviathan Mine into Leviathan Creek is a discharge of pollutants from a point source into navigable waters of the United States.

Clean Water Act controls are imposed on industries through National Pollutant Discharge Elimination System permits, or Waste Discharge Requirements, which are permitted on a case by case basis. No permit is required since the discharges from the treatment plant will occur on-site pursuant to a removal action selected and carried out under CERCLA. CERCLA § 121(e)(1), 42 U.S.C. § 9621(e)(1). However, to the extent practicable under all the exigencies of the situation, a discharge must meet the substantive requirements of such a discharge permit.

In establishing discharge limits, the permitting agency requires, at a minimum, that the discharger comply with the effluent limitations established under the Clean Water Act for the specific industrial category of the discharger. In the event there are no specific effluent limitations for the type of discharge at issue, the statute provides that the permit shall contain "such conditions as the Administrator determines are necessary to carry out the provisions of this chapter." CWA § 402(a)(1)(B), 33 U.S.C. § 1342(a)(1)(B). EPA uses "best professional judgment" to establish the effluent limitations if there is no regulation for the specific discharge category.

There are no technology-based effluent limitations specifically identified for inactive sulfur or copper mines. There are technology-based limitations for active copper mines. 40 C.F.R. §§ 440.102(a) and 440.103(a). Because the problems of AMD from historic mining at the Site are similar to the problems of existing active copper mines, the effluent limitations for such copper mines are relevant and appropriate at the Site.

Furthermore, EPA determines, in the exercise of its best professional judgment, based on the results from the last three years of operation of the Leviathan Mine biphasic system, that it is practicable at this time to meet standards set forth in Table 1 below, except during the initial two weeks of implementation of the treatment ("start-up period") or during optimization trials intended to ultimately improve treatment performance.

Table 1 presents both maximum and four-day average discharge criteria for the protection of aquatic life from acute and chronic exposure effects, respectively. Both average and maximum criteria in Table 1 are to be measured at a point before the treated water is discharged. The criteria for eight minerals (arsenic, cadmium, chromium, copper, lead, nickel, selenium and zinc) are derived from the Numeric Criteria

for Priority Toxic Pollutants for the State of California in 40 C.F.R. § 131.38(b)(2). The maximum concentration equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. The average concentration equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects.

The Removal Action Memorandum of 2000 included the listed standards for arsenic, copper and nickel. These had been considered the contaminants most threatening to aquatic life in the Leviathan AMD and the treatability studies for the bi-phasic system had carefully monitored for these contaminants. During the 2000 Removal Action, concentrations for all the Priority Toxic Pollutants were monitored in the treated AMD, and the standards were readily achieved. The addition of criteria for five inorganic Priority Toxic Pollutants to Table 1 in the July 5, 2001 RAM completed the list of metals for which continuous concentration criteria were established in 40 C.F.R. § 131.38(b)(2). The contaminants and the standards were attained in 2001 and 2002, and are unchanged for the Removal Action in 2003.

Freshwater aquatic life criteria for metals are a function of the total hardness of the receiving water body. Hardness is a measure of dissolved calcium and magnesium expressed in mg/L. The presence of these minerals in water tends to decrease the toxicity of metals, such that a concentration of metals that are toxic to aquatic life when the hardness is 50 mg/L might not be toxic in water at 400 mg/L of hardness.

The discharge criteria in Table 1 are calculated for receiving water with a hardness of 200 mg/L (Ca $CO_3$). The hardness measured in Leviathan and Bryant Creeks below the mine during July and August of 2000 during low flow conditions ranged from well above 400 mg/L (very hard) to approximately 200 mg/L (moderately hard, in Bryant Creek). Hardness values in Leviathan and Bryant Creeks also tend to decrease with dilution from snowmelt during higher flow periods. Although a specific point of compliance has not been formally established, it is EPA's goal to protect aquatic life that was observed in Bryant Creek during the removal actions in recent years. Given the exigencies of the situation, restoration of the aquatic community currently absent from Leviathan Creek above the confluence with Mountaineer Creek will not be practicable this summer through this response action. Therefore EPA's best professional judgement is to use the moderate hardness value of 200 mg/L, as measured in the upper reaches of Bryant Creek, to calculate the discharge standards for this removal action in 2003.

The criteria selected through best professional judgment are at least as protective as the criteria for effluent from active copper mines and the water quality standards promulgated by EPA for the State of California in 40 C.F.R. § 131.38(b)(2). The range for pH in Table 1 is equal to the range for pH for effluent from active copper mines set

forth in 40 C.F.R. §§ 440.102(a) and 440.103(a). The criteria in Table 1 for copper are more protective than those provided for effluent from active copper mines in 40 C.F.R. §§ 440.102(a) and 440.103(a). The criteria in Table 1 for dissolved iron are consistent with those provided for effluent from active iron mines set forth in 40 C.F.R. §§ 440.12 and 440.13, and also consistent with guidance for water quality from Quality Criteria for Water, EPA 440/5-86-001 (Washington, D.C. 1986).

The aluminum criteria in Table 1 are based on results from the Leviathan Mine bi-phasic system operational data over the last four years (1999-2002). These criteria for aluminum are not as protective as the limits for effluent from active aluminum mines set forth in 40 C.F.R. §§ 440.22 and 440.23, which may be ARARs. In past trials, efforts to maintain low aluminum concentrations resulted in less efficient removal of nickel, and higher standards were necessary to ensure the promulgated aquatic life standards for nickel were achieved. Future discharge criteria for aluminum will consider treatment system effectiveness and risk-based goals in light of the expected operating improvements due to more consistent and lower concentrations of contaminants in the AMD.

TABLE I
DISCHARGE CRITERIA

| Water Quality Parameter | Maximum f2 | Average f4 |
|---|---|---|
| pH | | Between 6.0 and 9.0 SU f1 |
| Arsenic (dissolved) | 0.34 mg/l | 0.15 mg/l f3 |
| Aluminum (dissolved) | 4.0 mg/l | 2.0 mg/l f3 |
| Cadmium (dissolved) | 0.009 mg/l | 0.004 mg/l f3 |
| Chromium (dissolved) | 0.97 mg/l | 0.31 mg/l f3 |
| Copper (dissolved) | 0.026 mg/l | 0.016 mg/l f3 |
| Iron (dissolved) | 2.0 mg/l | 1.0 mg/l f3 |
| Lead (dissolved) | 0.136 mg/l | 0.005 mg/l f3 |
| Nickel (dissolved) | 0.84 mg/l | 0.094 mg/l f3 |
| Selenium (total recoverable) | Not Promulgated | 0.005 mg/l f3 |
| Zinc (dissolved) | 0.21 mg/l | 0.21 mg/l f3 |

f1 pH measurement based on 24-hour (single day) average discharge.
f2 Concentrations based on daily grab samples, each grab sample field-filtered and acid fixed promptly after collection.
f3 Concentrations based on four daily grab samples, each grab sample field-filtered and acid fixed promptly after collection.
f4 If the concentration detected by the contract laboratory is less than the detection limit, ½ the detection limit shall be used in calculating the Average concentration.

Sludge disposal. Sludge produced from the treatment of AMD at Leviathan is excluded from regulation under RCRA Subtitle C pursuant to the Bevill Amendment. 42 U.S.C. § 6921(b)(3)(A)(ii). Additionally, any sludge produced as part of this removal is not expected to exceed any federal hazardous waste characteristics. Wastes from the extraction, beneficiation, and processing of ores and minerals that are not subject to regulation under Subtitle C are exempt from regulation as hazardous waste under California's Hazardous Waste Control Act. H&SC § 25143.1.

The sludges will be regulated under section 13172 of the California Water Code, which specifically covers mining waste, and the Code's implementing regulations found at 27 CCR 22470 et seq.

Should any sludge that exhibits hazardous waste be disposed of off-site, CERCLA's Off-Site Rule found in section 300.440 of the NCP will be complied with.

Other Potential ARARs. It is not anticipated that this removal action will negatively implicate other potential ARARs, such as the Endangered Species Act, the Archeological and Historic Preservation Act of 1974, the National Historical Preservation Act, or the Hazardous Materials Transportation Act.

5. Project schedule

The estimated length of time needed to install the treatment system and treat the AMD is 120 days, with mobilization in July and demobilization in October.

B. Estimated Costs

Cost Projection Scenario: EPA oversight contractor

Cost Projection Summary

| | |
|---|---|
| Removal Action Implementation Costs [Extramural to EPA] | $ 1,500,000 |
| EPA Total (EPA contractors) | $ 50,000 |
| Project Total | $ 1,550,000 |

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If action is delayed or not taken, the AMD evaporation ponds will continue to

collect and concentrate AMD. If the ponds reach their holding capacity, the AMD may overflow and cause an uncontrolled release of AMD to the Carson River watershed. Any such uncontrolled release would adversely impact water quality, potentially threatening biota and humans. Removal of pond water provides flexibility for additional early response actions to control AMD releases at the Channel Underdrain and Delta Seep, and to conduct a field trial of the combined flow treatment system, which may not be implemented effectively if the action is delayed or not taken. Maintenance activities are necessary for personnel safety at the site and to minimize the release of AMD or sediment to Leviathan and Aspen Creeks.

## VII. OUTSTANDING POLICY ISSUES

None identified.

## VIII. ENFORCEMENT

A confidential Enforcement Addendum is attached to this Action Memo.

## IX. RECOMMENDATION

This decision document represents a selected removal action for Leviathan Mine Site, in Alpine County, California, and was developed in accordance with CERCLA, and is not inconsistent with the NCP. This decision is based on the administrative record file for the Site.

Conditions at the Site meet the NCP section 300.415(b)(2) criteria for a removal and I recommend your approval of the proposed removal action. The total project ceiling, most of which will be incurred by the LRWQCB, will be $ 1,550,000. Of this, an estimated $ 50,000 comes from the Regional budget. The balance will be sought through negotiations with potentially responsible parties.

Keith Taka — 7-28-05

Approval Signature — Date

Disapproval Signature — Date

# WORK PLAN

## For

## 2003 SITE WORK BY THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD LAHONTAN REGION

## At

## LEVIATHAN MINE
## Alpine County, California

*Prepared For:*

**U.S. Environmental Protection Agency – Region IX**
**San Francisco, CA**

*Prepared By:*

**California Regional Water Quality Control Board, Lahontan Region**
**South Lake Tahoe, CA**

# 2003 WORK PLAN FOR SITE WORK AT LEVIATHAN MINE

## Table of Contents

## 8. ATTACHMENTS

2003 Site Control Plan for Leviathan Mine ..... Attachment 1

Quality Assurance Project Plan (QAPP) for
Pond Water Treatment ..... Attachment 2 (*pending*)

QAPP for Surface Water Quality Monitoring at
Leviathan Mine Superfund Site ..... Attachment 3 (*pending*)

# 1. INTRODUCTION

## 1.1. Background

Leviathan mine is an inactive sulfur mine that the State of California acquired in the early 1980s in order to cleanup water quality problems caused by historic mining. Jurisdiction over Leviathan Mine rests with the State Water Resources Control Board (SWRCB), which, in turn, has delegated jurisdiction over cleanup work to the California Regional Water Quality Control Board, Lahontan Region (RWQCB).

The former sulfur mine is located on the eastern slope of the Sierra Nevada Mountains in Alpine County, California, and encompasses approximately 450 acres with mining disturbance on approximately 231 acres. The subject property includes a portion of Sections 14, 15, 22, and 23, in Township 10 north of Range 21 east of the Mount Diablo Meridian, Alpine County, Mineral Survey Nos. 6365A and 6365B. Leviathan Mine is approximately six miles east of Markleeville, California and five miles west of Topaz Lake, Nevada. The United States Department of Agriculture, Forest Service, Humboldt-Toiyabe National Forest (USFS) owns the majority of surrounding land, with the exception of ten private parcels along the southern boundary of the mine site.

Historic mining activities at Leviathan Mine included underground and open pit extraction of sulfur. These activities resulted in the exposure of pyrite, contained in the native soil and rock, to air and water. Exposure of pyrite to air and water causes the generation of acidic drainage, also referred to as acid mine drainage (AMD). As AMD travels through the ground, it dissolves and carries metals contained in the native soil and rock. If left unabated, acidic and metal-rich AMD may discharge to nearby creeks (Leviathan and Aspen) causing adverse impacts. In addition, historic mining activities resulted in significant soil disturbance, erosion, and sediment deposition to nearby receiving waters.

Leviathan and Aspen creeks flow across the mine site and eventually join below the mine. The combined flow of Leviathan and Aspen creeks enters Bryant Creek, and Bryant Creek flows across the Nevada state line and into the East Fork of the Carson River.

Acting on the State's behalf, the RWQCB has implemented several projects to abate and quantify the discharge of pollutants (AMD and sediment) from Leviathan Mine. In 1985, the RWQCB completed construction of a pollution abatement system at Leviathan Mine to address specific problem areas (see Figure 1). The 1985 project reduced the pollutant load to receiving waters; however, the project did not address all sources of pollution.

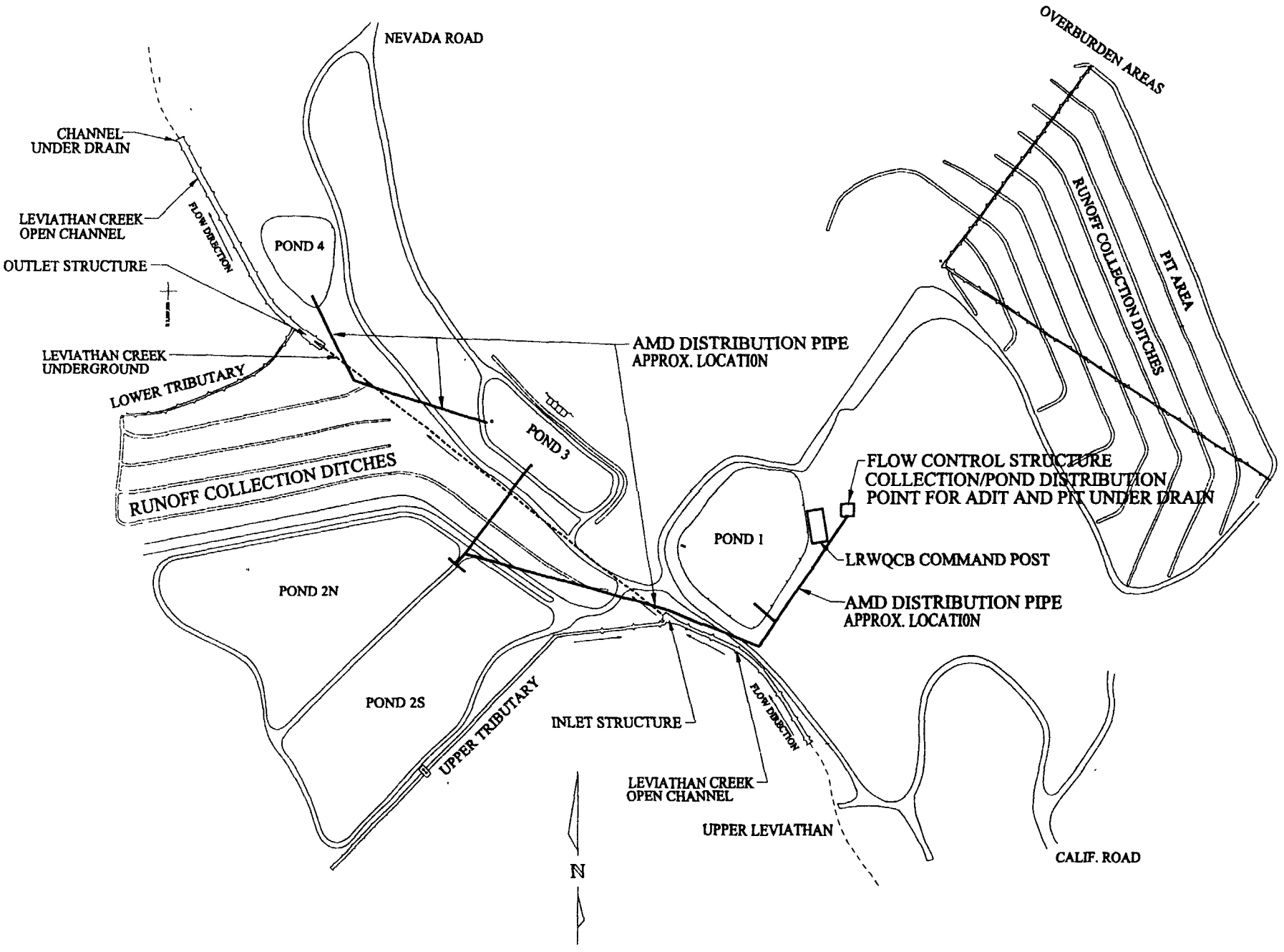


Figure 1. 1985 Pollution Abatement Project

In May 2000, the United States Environmental Protection Agency (USEPA) placed Leviathan Mine on the National Priorities List, thus making Leviathan Mine a federal Superfund site. Because the State of California is the present property owner, USEPA has identified the State as a Potentially Responsible Party. USEPA may direct Potentially Responsible Parties to take certain actions to characterize and abate pollution at Superfund sites. On July 19, 2000, pursuant to its authority under the Comprehensive Environmental Response, Compensation, and Liability Act, USEPA issued an Administrative Abatement Action (AAA) to the RWQCB and thereby directed the RWQCB to implement certain pollution abatement and site characterization activities at Leviathan Mine. With only slight modification, USEPA reissued the AAA in 2001 and 2002 and thereby directed RWQCB activities during the 2001 and 2002 field seasons. It is expected that USEPA will continue to direct RWQCB work at Leviathan Mine through annual reissues of the AAA, until a remedy addressing all releases of hazardous substances at Leviathan Mine is implemented (potentially by other parties).

## 1.2. 2003 RWQCB Activities

The RWQCB's planned activities for the 2003 field season, which typically runs from approximately mid-June through mid-October, include: 1) treatment of AMD held in evaporation ponds (pond water treatment); 2) revegetation of areas adjacent to ponds 1, 2-North, 2-South, and 3; 3) site maintenance; and 4) continued implementation of surface water monitoring. All of the aforementioned activities are described in detail in this Work Plan.

## 1.3. RWQCB Personnel and Assignments

The RWQCB has designated the following individuals as the key members of the project team to be associated with 2003 work at Leviathan Mine:

**RWQCB Project Team:**

| Title | Name | Assignment | Telephone (530) 542- |
|---|---|---|---|
| Sr. Water Res. Control Engineer | Chris Stetler | Overall project management | 5461 |
| Engineering Geologist | Doug Carey | Pond water treatment | 5468 |
| Environmental Specialist | Brian Johnson | Site maintenance | 5466 |
| Environmental Specialist | Laurie Scribe | Site monitoring | 5465 |
| Water Res. Control Engineer | Robert Tucker | Revegetation | 5467 |

## 1.4. Site Control Plan

All site activities must comply with the Site Control Plan for Leviathan Mine (Attachment 1). The Site Control Plan contains specific information on site facilities, communications (routine and emergency), project contacts (RWQCB,

Atlantic Richfield Company, USEPA), health and safety requirements, and coordination of site activities.

## 2. POND WATER TREATMENT

### 2.1. Background

As mentioned above, in 1985, on the State's behalf the RWQCB completed construction of a pollution abatement system at Leviathan Mine to address specific problem areas. The 1985 project included construction of five lined evaporation ponds to capture and evaporate AMD. The primary source of AMD to the ponds is referred to as the "Adit". The Adit comprises portions of remnant mining tunnels. A secondary minor source of AMD to the ponds is the Pit Under Drain (PUD). The PUD comprises a series of rock filled trenches and perforated pipes installed as part of the State's 1985 project to drain groundwater from the floor of the mine pit.

Given the limited usable area at the mine site, the evaporation ponds could not be sized to provide 100 percent containment of influent flows (consisting of AMD from the Adit and PUD, and direct rain/snow onto the ponds); consequently, the ponds periodically overflowed and discharged to Leviathan Creek. The evaporation ponds were intended to reduce the volume of AMD discharged to Leviathan Creek (via evaporation) and to prevent the discharge of AMD until the flow in receiving waters was expected to provide the greatest dilution. The evaporation ponds cover a cumulative surface area of approximately 12.8 acres with a cumulative holding capacity of approximately 16 million gallons (ARCO Environmental Remediation, LLC, 1999).

In order to prevent pond overflows, the RWQCB assessed a treatment process that enabled the treatment and discharge of treated pond water during the summer months, as a means to increase pond holding capacity for the subsequent winter and spring months. The RWQCB assembled a treatment system during the 1999 field season and tested the process at full-scale during the 1999 and 2000 field seasons. The ponds have not overflowed since initiation of the RWQCB's summer treatment program in 1999. A schematic of the RWQCB's treatment system is provided as Figure 2.

### 2.2. Description of Treatment Process

The process employed by the RWQCB to treat pond water is referred to as biphasic neutralization. The biphasic neutralization process had been identified through laboratory and field-testing as a means to treat pond water, produce high quality effluent, and control the quality of the sludge produced by the process. While the neutralization of AMD by the addition of alkalinity has long been accepted as an effective means to raise pH and remove metals in AMD, laboratory

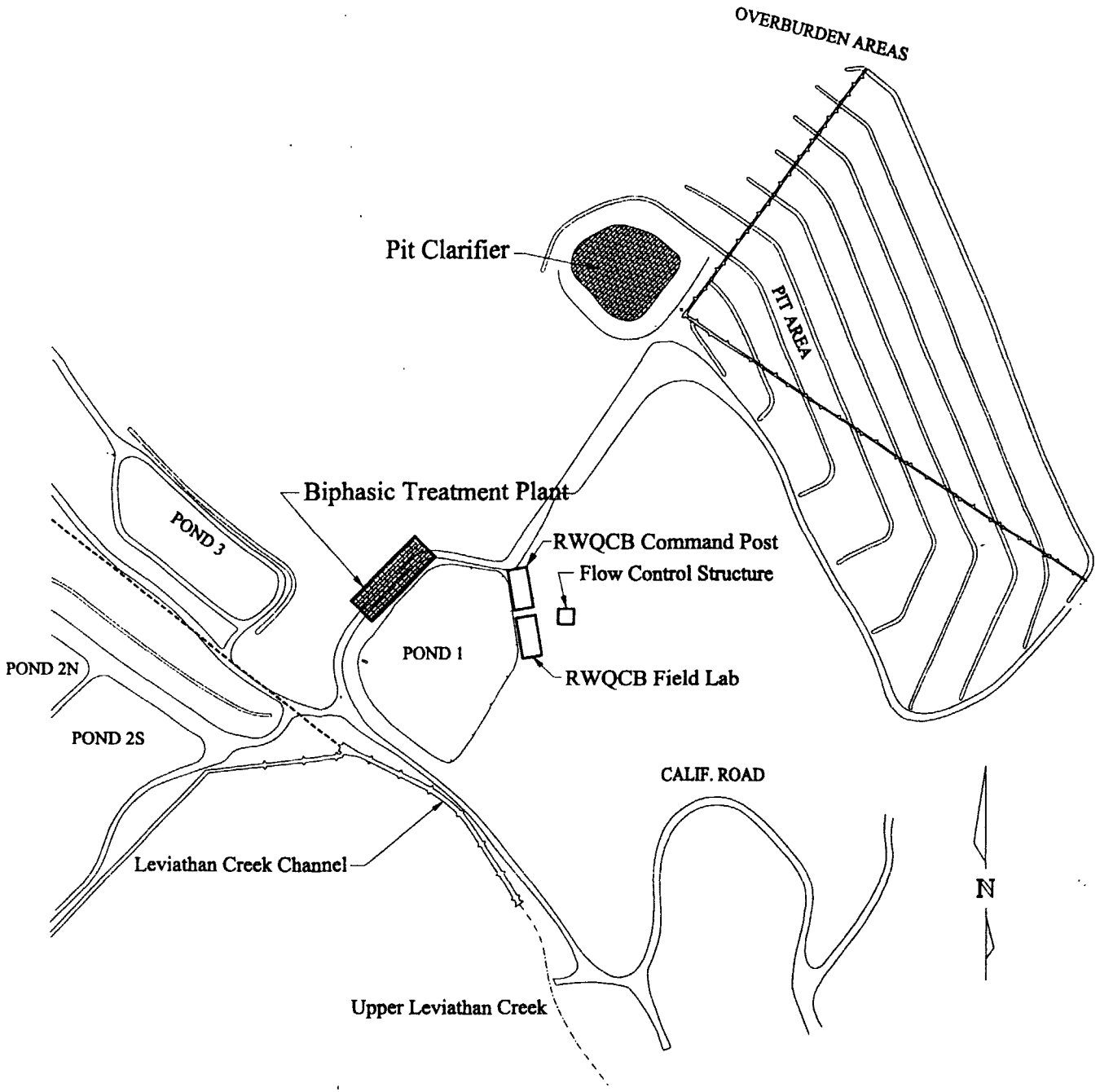


Figure 2. Biphasic Treatment System Location

and field-testing of pond water demonstrated that monophasic (single phase) neutralization of pond water would produce a large volume of sludge that would be considered hazardous by California standards. Laboratory and field-testing demonstrated that the sludge produced by single phase neutralization of pond water would exceed the Total Threshold Limit Concentration [TTLC] for arsenic. When the total concentration of any constituent equals or exceeds its TTLC, by California standards the waste is considered to be hazardous. Biphasic (two-phase) treatment provides a means to treat pond water and significantly reduce the volume of hazardous sludge generated by the process.

The biphasic process consists of neutralizing AMD by the addition of alkalinity in two phases, hence the name biphasic. Sludge is produced in both phases of the biphasic process. While sludge generated during the first phase of treatment of pond water exhibits hazardous characteristics, based on the concentration of arsenic, the volume of Phase 1 sludge is relatively low and represents approximately 5 to10 percent of the total volume of sludge generated by the biphasic process. The second phase sludge does not exhibit hazardous characteristics and represents approximately 90 to 95 percent of the total volume of sludge from the process.

In the first phase of the biphasic process, the pH is raised to approximately 2.8 which causes iron to precipitate out of solution as ferric hydroxide ($Fe(OH)_3$). During this precipitation, the arsenic "co-precipitates" or is adsorbed to the $Fe(OH)_3$ to form Phase 1 sludge. The pH of the partially treated AMD is then raised to approximately 8.5 which causes the remaining metals to precipitate out of solution, forming Phase 2 sludge.

## 2.3. Schedule

In order to prevent pond overflows, the RWQCB will implement biphasic treatment during the 2003 summer months, as a means to increase pond holding capacity for the subsequent winter and spring months. The primary objective is to provide enough storage capacity in the ponds to contain the volume of AMD, from the Adit and PUD, and direct precipitation on the ponds that occurs between October 2003 and July 2004.

The RWQCB's schedule for pond water treatment coincides with schedules developed by Atlantic Richfield Company (ARC) for the 2003 field season. During the 2003 field season, ARC proposes to use all, or portions of, the RWQCB's pond water treatment system for purposes of evaluating treatment of combined flows consisting of AMD from the Adit, PUD, Channel Under Drain (CUD), and the Delta Seep. ARC proposes to commence combined flow studies before the RWQCB commences pond water treatment. ARC will: (a) mobilize portions of the pond water treatment system in May of 2003 (weather permitting) in order to perform the combined flow studies from approximately early-June to

mid-July, 2003; (b) reconfigure the treatment system to enable commencement of pond water treatment in mid-July 2003; (c) following completion of pond water treatment, and weather permitting, reconfigure the system to perform additional combined flow studies; and d) demobilize and winterize all portions of the treatment system used for pond water treatment and combined flow studies at the end of the field season. The RWQCB will treat pond water in the biphasic mode from mid-July to approximately mid-August. The project schedule is summarized in Table 2, below. Additional details pertaining to ARC's planned activities are provided in ARC's work plans for early response actions (submitted directly to USEPA).

**Table 1, Schedule of Completion Dates**

| Description | Anticipated Completion Date |
|---|---|
| Submit Health & Safety Plan | June 2, 2003 |
| System assembly and ARC Combined Flow Treatment Studies | May 27 to July 14, 2003 |
| Pond Water Treatment | July 15 to August 15, 2003 |
| ARC Combined Flow Treatment Studies and System Winterization | August 16 to October 17, 2003 (weather permitting) |

## 2.4 Discharge Criteria

Table 2 contains the effluent standards to be applied to the treatment system. Effluent may be discharged to Leviathan Creek so long as it meets these discharge criteria, or other discharge criteria identified in writing by the USEPA.

**Table 2, Discharge Criteria**

| Water Quality Parameter | Discharge Criteria | |
|---|---|---|
| | MAXIMUM [f3] | AVERAGE [f5] |
| PH | -- | Between 6.5 – 9.0 SU [f2] |
| Arsenic [f1] | 0.34 mg/l | 0.15 mg/l [f4] |
| Aluminum [f1] | 4.0 mg/l | 2.0 mg/l [f4] |
| Cadmium [f1] | 0.009 mg/l | 0.004 mg/l [f4] |
| Chromium [f1] | 0.97 mg/l | 0.31 mg/l [f4] |
| Copper [f1] | 0.026 mg/l | 0.016 mg/l [f4] |
| Iron [f1] | 2.0 mg/l | 1.0 mg/l [f4] |
| Lead [f1] | 0.136 mg/l | 0.005 mg/l [f4] |
| Nickel [f1] | 0.84 mg/l | 0.094 mg/l [f4] |
| Selenium (Total Recoverable) | Not Promulgated | 0.005 mg/l [f4] |
| Zinc [f1] | 0.21 mg/l | 0.21 mg/l [f4] |

f1 .....Dissolved Metals.
f2 .....pH measurement based on 24-hour average discharge.
f3 .....Based on a daily grab sample, field-filtered and acid fixed promptly after collection.
f4 .....Based on four daily grab samples, each grab sample field-filtered and acid fixed promptly after collection.
f5 .....If the concentration detected by the contract laboratory is less than the detection limit, ½ the detection limit shall be used in calculating the Average concentration.

## 2.5. Pond Water Treatment Tasks

For the 2003 operating season, RWQCB staff have established a contract with Unipure Environmental for operation and maintenance of the treatment system. Mobilization and winterization/demobilization of the treatment system shall be accomplished by ARC under separate contract with Unipure Environmental. Specific tasks to be completed under the RWQCB contract with Unipure Environmental include the following:

**2.5.1.** Update Health & Safety Plan: Contractor shall revise the project specific Health & Safety Plan to update:

a) Description of the project tasks;

b) Identification of physical and chemical hazards that may be encountered;

c) Health & Safety control measures to be implemented throughout the course of the project;

d) Description of Contractor personnel and their responsibilities, training, and medical surveillance requirements;

e) Identification of personal protective equipment and controls;

f) Decontamination protocols;

g) Emergency response procedures.

**2.5.2.** System Operation & Maintenance: Contractor shall provide a Senior Operator and other support staff meeting specific qualifications to operate and maintain the treatment system and appurtenances for the duration of biphasic treatment operations conducted during the 2003 treatment season (Table 2). Contractor shall treat AMD in the range of 80- 250 gallons per minute (unless directed otherwise by the Project Manager). Treated water must comply with applicable discharge criteria (Table 1) in order to be discharge to Leviathan Creek. Contractor shall:

a) Implement the Health & Safety control measures prescribed in the Revised Project Health & Safety Plan for the duration of the project;

b) Treat AMD held in the site evaporation ponds and/or other sources of acidic drainage (as directed by the Project Manager) by operating and maintaining the treatment system in accordance with revised standard operating procedures;

c) Provide consumables for the treatment system, including: lime slurry (45% by weight), fuel, polymer for Phase I and II reactions;

d) Maintain labor support facilities for the project, including: restroom(s), field office, drinking water supply;

e) Only discharge treated effluent that meets the specified discharge criteria to Leviathan Creek (see Table 1);

f) Return effluent that does not meet the specified discharge criteria to the evaporation ponds;

g) Convey Phase II effluent slurry to the Pit Clarifier;

h) De-water Phase I sludge by means of a filter press;

i) Provide 10-cubic yard roll-off bins for containment and transport of Phase I sludge;

j) Transport Phase I sludge to an approved Class I disposal facility (unless directed otherwise by the Project Manager);

k) Monitor and record sludge production rates (Phase I and II), and consumables usage;

l) Conduct daily health and safety meetings;

m) Complete operator log sheets (including daily operating checklist);

n) Compile a Data Report that includes all operator log sheets, records of sludge production rates, and consumables usage. The data shall be arranged in tables to simplify review;

o) Conduct and maintain good housekeeping practices for the duration of this task;

p) Provide emergency repair services as necessary;

q) In the event that operations are conducted during non-daylight hours, Contract shall provide all necessary lighting and necessary labor support services.

## 2.6. Discharge Monitoring

### 2.6.1. Effluent Water Quality Monitoring Program

All sampling and analysis related to the 2003 pond water treatment project shall be conducted in strict accord with the *Quality Assurance Project Plan (QAPP) for Pond Water Treatment Monitoring* (Attachment 2, *pending*). The *QAPP for Pond Water Treatment Monitoring* includes Data Quality Objectives. The following is a summary of the pond water treatment monitoring program:

RWQCB staff shall collect one grab sample of treated effluent on a daily basis. The sample shall be collected from the effluent stream as it enters the concrete storm water junction box located south of the Pit Clarifier. RWQCB staff shall measure and record pH of the grab sample in the field. RWQCB staff shall filter and acid fix (once filtered, adjust the pH to 2 or less with nitric acid [about 1.5 mL per liter]) the sample in the field

laboratory. The grab sample shall be submitted for laboratory analysis for dissolved Arsenic (As), Aluminum (Al), Cadmium (Cd), Chromium (Cr), Copper (Cu), Iron (Fe), Lead (Pb), Nickel (Ni), Zinc (Zn), and Total Recoverable Selenium (Se).

Twice weekly, the daily grab sample of treated effluent and an influent sample (untreated pond water) shall be submitted for the following analysis: sulfate, total dissolved solids (TDS), hardness as Calcium Carbonate ($CaCO_3$), dissolved As, Al, Cd, Calcium (Ca), Cr, Cobalt (Co), Cu, Fe, Pb, Magnesium (Mg), Manganese (Mn), Ni, Zn, and Total Recoverable Se.

In an effort to provide "real-time" treated effluent water quality data, RWQCB shall operate a field laboratory at Leviathan Mine. When treated effluent is being discharged to Leviathan Creek, RWQCB staff shall collect and field analyze at least one grab sample per day. Field analysis will be for dissolved As, Al, Cu, Fe, and sulfate. Results from the analysis will be recorded on a daily data sheet.

Methods to provide Quality Control and Quality Assurance, and additional details on both offsite and onsite water quality analytical procedures to be used on the above samples are further described in the *QAPP for Pond Water Treatment Monitoring* (Attachment 2, *pending*).

### 2.6.2. Sludge Monitoring Program

All sampling and analysis related to the 2003 pond water treatment project shall be conducted in strict accord with the *QAPP for Pond Water Treatment Monitoring* (Attachment 2, *pending*).

Phase I: The volume of phase I sludge generated by the process shall be recorded by tracking the number of filter press runs and off-site shipments of phase I sludge. All filter press runs shall be recorded on a log sheet.

A grab sample of phase I sludge shall be collected from the phase I bin following each filter press run. Once every seven days, the grab samples collected from the previous seven days worth of filter press runs shall be composited and sent to the contract lab for the following analysis: TTLC, and Soluble Threshold Limit Concentration (STLC) analysis for Title 22 Metals, aluminum and iron.

Phase II: The volume of phase II sludge generated by the process shall be calculated at the end of the treatment season following de-watering of the Pit Clarifier.

Samples of phase II sludge shall be collected from the Pit Clarifier at the end of the treatment season following partial de-watering of the Pit

Clarifier. The phase II sludge samples shall be sent to the contract lab (under Chain-of-Custody procedures) for TTLC and STLC analysis for Title 22 Metals, aluminum and iron.

Methods to provide Quality Control and Quality Assurance, and additional details on the analytical procedures to be used on the above samples are further described in the *QAPP for Pond Water Treatment Monitoring* (Attachment 2, *pending*).

# 3. REVEGETATION

## 3.1. Background

The RWQCB's 1985 pollution abatement project at Leviathan Mine included revegetation work; however, these early attempts to revegetate were not successful. Failure to establish vegetation was due to poor soil conditions throughout the site and other harsh conditions including lack of water.

Since completion of the 1985 project, RWQCB staff have worked with the University of California at Davis (UCD) and the Department of Conservation (DOC) to develop improved specifications for revegetation work at Leviathan Mine. Research by UCD shows that adding lime and compost to site soils improves the success of revegetation efforts. The addition of lime and compost increases the depth of root penetration; thereby, increasing a plant's ability to obtain moisture through the dry season.

## 3.2. Revegetation Tasks

RWQCB staff will conduct the below-listed revegetation projects at Leviathan Mine during the 2003 field season.

### 3.2.1. Revegetation Adjacent to Evaporation Ponds

RWQCB staff will establish a contract for revegetation work on areas adjacent to the site evaporation ponds. The total area to be addressed is approximately 9.3 acres. The selected areas shall first be amended with lime and compost, then planted and seeded, and finally provided with an erosion control treatment. Erosion control treatment shall include one or more of the following: willow wattles, pine needle mulch, punched straw, hydrospray wood mulch, and erosion control mats.

As stated above, the soils will first be amended with lime and compost. Most research conducted onsite has recommended incorporation of buffering agents into the soil and increasing both nutrients and organic matter in the soil. The lime provides the buffering agent and the compost provides both nutrients and organic matter. The amendments will be

worked into the soil by heavy equipment with either ripping shanks, moldboard plow, or ripping and injecting shanks.

After the amendments have been spread and mixed with the soils, each bench will have up to 125 plants planted, and seeded with 20 pounds of live seed per acre. The plants to be planted will be the following species: Artimesha Tridentata, Cercocarpus Ledifolius, Ceanothus Velutinus, Purshia Tridentata, Ribes Cereum, Eriogonum Umbellatum and Achillea Millefolium. The seeds will be made up of a blend of the following the seed list.

| | |
|---|---|
| Grasses: | Elymus elymoides - Squirreltail<br>Poa secunda - Blue Grass<br>Anhnatherum hymenoides - Ricegrass<br>Elymus cinereus - Great Basin Wild Rye |
| Asteracea: | Artemisia millefolium - Yarrow<br>Artemisia tridentata - Big Sagebrush<br>Chrysothamnus nauseosus - Rubber Rabbit Brush<br>Chrysothamnus vicscidiflorus - Yellow Rabbit Brush |
| Fabaceae: | Lupinus Argenteus<br>Var. Andersonii - Andersons Lupine<br>Var. Meionanthus - Tahoe Lupine |
| Polygonacea: | Eriogonum Umbellatum - Sulfur Buckwheat |

### 3.2.2. Invasive Plant Control

During the 2002 field season, the El Dorado County Department of Agriculture (EDCDA) visited Leviathan Mine and sprayed for Tall Whitetop (Lepidium Latifolium). EDCDA plans to revisit the site in 2003 on two occasions to again spot spray Tall Whitetop and look for other possible invasive plants of concern. EDCDA will use one of the following herbicides on the Tall Whitetop: Telar, Rodeo, or Transline.

### 3.2.3. Seed Collection

RWQCB staff has chosen to use native plants in continuing its revegetation efforts at Leviathan Mine. Due to the unique climate and conditions of the site, it is believed that the best seed source for propagation would be from collecting seeds on and around Leviathan Mine. Therefore, RWQCB staff shall be coordinating an effort to collect seeds on USFS lands and on Leviathan Mine. Collected seeds will be stored at the L.A. Moran nursery operated by the California Department of Forestry.

# 4. SITE MAINTENANCE

## 4.1. Site Maintenance Tasks

RWQCB staff will conduct the below-listed site maintenance tasks at Leviathan Mine during the 2003 field season.

### 4.1.1. Fence Repair

The USFS owns the majority of surrounding land, with the exception of ten private parcels adjacent to the south end of the state-owned property. USFS land is open to the public and is subject to grazing by cattle. To minimize public access and to prevent cattle from entering the Leviathan Mine property, a barbed wire fence was installed along the perimeter of the mine site. Due to mostly natural conditions, the fence needs repair on an annual basis. RWQCB staff will inspect the entire fence line, and conduct repairs as needed to ensure that the barbed wire fence is up around the mine site.

### 4.1.2. Offsite Road Maintenance

Access to Leviathan Mine is provided over USFS land by National Forest System Road 31052, also referred to as Leviathan Mine Road. Road 31052 extends northeasterly from State Highway 89 for about 5 miles, bypassing the mine site on the east side for about 2 miles, and extending northeasterly from Leviathan Mine for about 9 miles and connecting to U.S. Highway 395 (Nevada). RWQCB staff and contractors have been accessing Leviathan Mine via this road for purposes of cleanup enforcement activities, implementation of abatement measures, and conducting water quality monitoring, maintenance and remedial feasibility studies at Leviathan Mine.

The RWQCB has developed agreements with the USFS and ARC, to work cooperatively on road maintenance along portions of Road 31052. It is anticipated that the USFS will complete road maintenance work, including resurfacing (paving and placement of road base rock) on portions of Road 31052 between Highway 89 and Leviathan Mine, in the Fall of 2003.

### 4.1.3. Storm Water Conveyance Sediment Removal

Storm water conveyance/drainage ditches are located throughout the pond side of the mine site. Due to the lack of vegetation and unstable soil conditions, the storm water ditches typically receive sediment every year. In order for the ditches to function properly, accumulated sediment in the ditches should be removed periodically. RWQCB staff have contracted for the removal of sediment from the storm water ditches located around ponds 1, 2-North, and 2-South during the 2003 field season. Sediment removed from a ditch will be spread on the down slope area below the ditch. RWQCB staff will coordinate this work with 2003 revegetation work in order to provide erosion control.

### 4.1.4. Evaporation Pond Liners

RWQCB staff will inspect the perimeters of ponds 1, 2-North, 2-South, and 3 and identify areas where pond liners have become exposed to sunlight (caused by the erosion of earthen liner cover). RWQCB staff will install cover material upon the identified areas. Cover material shall consist of native material from areas adjacent to the ponds with grain size similar to existing cover material in the ponds.

During the 2001 field season, RWQCB staff became aware that at certain times of year, standing water appeared in valve boxes located along the center dike between ponds 2-North and 2-South. RWQCB staff were concerned that perhaps the booted pipe penetrations to ponds 2-North and 2-South were leaking. In response to these concerns, during the 2002 field season, the RWQCB (through California Department of General Services [DGS]), hired an engineering consulting firm to evaluate the inlet and outlet boots on ponds 1, 2-North, 2-South, and 3, and to provide recommendations for corrective actions. The assessment was conducted in October 2002 and the results of the assessment are presented in the January 8, 2003 report titled, "*Geomembrane Boot Inspection Report, Leviathan Mine Ponds, Alpine County, California*". The report concludes that the geomembrane used to seal pipe penetrations to the pond liner are in need of repair. The pond liner appears to be in good condition.

The RWQCB (through DGS) has established a contract with an engineering consulting firm to produce design drawings and construction specifications for necessary corrective work on the pond boots. The drawings and specifications for corrective work will be generated during the 2003 field season, with actual construction work scheduled to occur in the Fall of 2004.

### 4.1.5. Leviathan Creek Channel Diversion

During the 2001 field season, working under contract with the RWQCB (through DGS), a consulting firm conducted an initial assessment of the Leviathan Creek concrete channel and pipeline. The subject assessment included surface inspection of both the channel and pipeline (via video taping) and evaluation of corings from the channel. For the 2003 field season, the RWQCB (through DGS) will continue to assess the pipeline by evaluating those portions of the pipeline that are in direct contact with mining wastes and acidic ground water. It is anticipated that the assessment work will include coring of the pipeline portions, and possibly excavation to permit inspection of the pipeline walls.

In addition, the RWQCB has established a contract (through DGS) for the removal of accumulated sediment and debris from the lower portions of the Leviathan Creek channel. RWQCB staff is concerned that various riparian vegetation that has established in the lower Leviathan Creek channel is threatening (via root penetration) the integrity of the concrete structure. In

addition, accumulated sediment in the lower Leviathan Creek channel makes it impossible to thoroughly assess the condition of the concrete along the channel bottom. The sediment to be removed is non-hazardous (based on testing conducted in 2001). The removed sediment will be spread on the area north of the lower tributary and west of the Leviathan Creek channel. Erosion control measures will be installed as necessary to prevent the erosion of dredged sediments into surface waters. This work is scheduled to occur in the Fall of 2003 following pond water treatment.

#### 4.1.6. Delta Slope Stabilization

The Delta Seep is an acidic seep located on the northwest side of Leviathan Mine, north east of pond 4. The saturated slope above the Delta Seep is comprised of waste earthen materials from open pit mining activities that occurred during the 1950s. The slope above the Delta Seep is showing signs of saturation and movement. RWQCB staff is concerned about the potential for a catastrophic failure of this slope. Such a failure could result in the loss of site structures and the release of millions of gallons of acid mine drainage to Leviathan Creek. The area of concern encompasses approximately two acres.

Under contract with the RWQCB, and geotechnical consulting firm conducted an initial geotechnical investigation on the slope above the Delta Seep. The consulting firm found that slope failure is not imminent, but that long-term measures should be taken to stabilize the slope. The RWQCB has transferred funds to DGS to design long-term slope stability measures. During the 2003 field season, DGS will be conducting various pre-design activities including field logging of test pits, and materials testing of soil samples. It is anticipated that DGS will submit final drawings and specifications by early-September 2003 with an Invitation for Bid (IFB) for the construction work to be advertised in October 2003. Construction of the Delta Slope project is scheduled to commence during the 2004 field season.

## 5. SITE MONITORING

### 5.1. Site Monitoring Tasks

The RWQCB will continue to implement their monitoring programs for surface water quality, surface water flow, meteorological, and biomonitoring, as specified below.

#### 5.1.1. Surface Water Quality

RWQCB staff will monitor surface water quality on a monthly basis at eleven stations within the Leviathan/Bryant Creek watershed (see Table 3). All water quality sampling shall be conducted in accordance with the RWQCB's *2003 Quality Assurance Project Plan (QAPP) for Surface*

## Table 3
## Surface Water Quality Sampling Stations

| RWQCB Station ID | Site Description | Sampling Frequency | Parameters Measured |
|---|---|---|---|
| Station 1 | Leviathan Creek above LM | Monthly | Total and Dissolved Al, As, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Ni, Zn; Hardness (as CaCO3) (calculated from Ca and Mg); Total Dissolved Solids (TDS); Sulfate; field pH, temperature, electrical conductivity, and specific conductance |
| Adit | Drainage from tunnel #5 diverted into evaporation ponds | Monthly | Same as above |
| Pit Under Drain (PUD) | Drainage form shallow ground water collection pipes in pit | Monthly | Same as above |
| Channel Under Drain (CUD) | Discharge from channel under drain below Leviathan Creek concrete channel | Monthly | Same as above |
| 4L Creek | 4L Creek just above confluence with Leviathan Creek | Semi-annual | Same as above |
| Station 15 | Leviathan Creek, above the confluence of Leviathan and Aspen creeks | Monthly | Same as above |
| Station 16 | Aspen Creek, above the confluence of Leviathan and Aspen creeks | Monthly | Same as above |
| Station 22 | Aspen Creek above LM | Monthly | Same as above |
| Overburden Seep (OS) | Overburden seepage (a.k.a Aspen Seep), above the Bioreactors | Monthly | Same as above |
| Station 23 | Leviathan Creek above the confluence of Leviathan and Mountaineer creeks | Monthly | Same as above |
| Station 24 | Mountaineer above the confluence of Leviathan and Mountaineer creeks | Monthly | Same as above |
| Station 25 | Bryant Creek below the confluence of Leviathan and Mountaineer creeks | Monthly | Same as above |
| Station 26 | Bryant Creek above the confluence of Doud Springs and Bryant creeks | Semi-annual | Same as above |

*Water Quality Monitoring at Leviathan Mine Superfund Site* (Attachment 3, *pending*). The RWQCB's *2003 Quality Assurance Project Plan (QAPP) for Surface Water Quality Monitoring at Leviathan Mine Superfund Site* prescribes Data Quality Objectives.

The stations sampled monthly by the RWQCB are summarized in Table 3, and include the following: Adit, PUD, CUD, Overburden Seep (OS), Stations 1, 15, 16, 22, 23, 24 and 25. In addition, Station 26 and 4L Creek will be sampled semi-annually, during the spring and fall.

RWQCB staff will record the following field parameters at each station: time, pH, water temperature, electrical conductivity, and specific conductance. RWQCB staff will sample for the following analytical parameters at each station: TDS, sulfate, and both total and dissolved (0.45 μm field filtered) As, Al, Ca, Cd, Cr, Co, Cu, Fe, Mg, Mn, Ni, and Zn. One duplicate sample and a field method blank will be taken each sampling run or every twenty samples for Quality Assurance/Quality Control (QA/QC). Hardness (as $CaCO_3$) will be calculated for each station using dissolved Ca and Mg.

#### 5.1.1.1. Deviations from 2002 Surface Water Monitoring

Deviations from the previous surface water sampling program include discontinuation of sample collection at Station 17, addition of a sampling station at 4L Creek, and eliminating Pb and Se from the list of parameters measured. Previous sampling by the RWQCB indicate that 4L Creek has very good water quality (low metals, low TDS, and low sulfate). In October 2003, United States Geological Survey (USGS) flow monitoring station will be added at 4L Creek (see Surface Water Flow, below) so limited water quality monitoring seems appropriate. The RWQCB proposes to collect water quality data on the 4L station once in the Spring and once in the Fall.

The RWQCB also proposes to discontinue sample collection at Station 17 (Leviathan Creek below the confluence of Aspen and Leviathan Creeks). Currently, flow data is not collected at Station 17, thus the water quality data cannot be used to determine loading of contaminants to the watershed. The RWQCB has monitored water quality at Station 17 since 1984. Between 1984 and 1999 water quality was monitored at least 3-4 times per year and from 2000 through the present the water quality was monitored on a monthly basis. This data gives a good picture of the health of the creek, however without flow information the data is not completely usable. Water quality and flow data are currently being collected on Leviathan Creek downstream of Station 17 at Station 23, and

upstream of Station 17 at Station 15. These two points give sufficient data to characterize the water quality of Leviathan Creek below the site.

Although not listed as measured parameters in the 2002 Work Plan for Site Monitoring, Total and Dissolved Pb and Total Recoverable Se were analyzed as part of the monthly monitoring program (as listed in the RWQCB's *2002 Year End Report*). For the period from July 2001 through December 2002, analysis for Pb showed only sporadic detection at the various stations. Almost all instances where Pb was detected the reported concentration was below 0.005mg/l. The most common station where Pb was detected was in the Adit water. The Adit discharges into the pond system and is then treated during the summer months. Pb is monitored both in the influent to and effluent from the treatment system. Based on the collected data Pb is not a contaminant of concern for the Leviathan watershed.

Total Recoverable Se was monitored from November 2001 through December 2002 during which time it was detected only occasionally. Almost all of the hits occurred at two locations, the PUD and Station 16 (Aspen Creek above the confluence with Leviathan Creek). As with the Adit, the PUD discharges into the pond system and is monitored in both the influent and effluent of the treatment system. The RWQCB believes that the Se detected at Station 16 may be coming from the Landslide Seep, a low-flow, high pH seep that feeds into Aspen Creek just above Station 16. Total Recoverable Se was detected in this seep at 0.034mg/l on 4/22/02. Se was detected in six of 15 sampling events at Station 16 and all of the reported concentrations were below 0.008 mg/l.

### 5.1.2. Surface Water Flow

Continuous flow measurements from the Adit, PUD, CUD, OS, and Stations 1, 15, 23, 25, and 26 will be monitored by the USGS under contract with the RWQCB. Monthly measurements will be made at Stations 16 and 24.

#### 5.1.2.1. Deviations from 2002 Flow Monitoring Program

Since the initiation of pond water treatment activities by the RWQCB in 1999, there has not been pond overflow (POF) from pond 4, so that station is being removed from the program. Beginning in October 2003, three new continuous flow monitoring stations will be installed at the following locations: Station 22, 4L

Creek, and in the Leviathan Creek concrete channel next to pond 4. Collecting flows at Station 22, located on Aspen Creek above the mine will give a more detailed measurement of flows in Aspen Creek. 4L Creek is a perennial tributary to Leviathan Creek and the station here will help fill gaps in the water balance for the site. The new station in the concrete channel (using the equipment currently used for POF) will help quantify inputs from the two seasonal tributaries that enter Leviathan Creek in-between Station 1 and the CUD.

### 5.1.3. Meteorological

During November 2002, RWQCB staff installed a weather station near on the RWQCB Command Post adjacent to pond 1. The weather station, a Davis Integrated Sensor Suite, has been operational since installation. The system measures the following conditions: wind speed, wind direction, rainfall, outside temperature, outside humidity, ultraviolet radiation, and solar radiation. RWQCB staff will download data from the weather station on a quarterly basis and transmit it to ARC for incorporation into the master database for Leviathan Mine.

### 5.1.4. Biomonitoring

The RWQCB's biomonitoring effort is a continuation of previous work performed by Dr. David Herbst (Sierra Nevada Aquatic Research Laboratory) in 1995, 1997, 1999, 2000, 2001, and 2002. All biomonitoring work shall be conducted in accordance with the *QAPP for Aquatic Invertebrate Bioassessment Monitoring in the Eastern Sierra Nevada* (available on-line at http://www.swrcb.ca.gov/rwqcb6/QAPP/QAPP_Index.htm). This work includes sampling of benthic macroinvertebrates in the vicinity of Stations 15, 16, 23, 24, 25, and Bryant Creek near the California/Nevada state line.

The sampling of benthic invertebrates at the above-listed sites shall occur during June 2003. Collection of invertebrates shall include five replicate stream invertebrate samples, taken from separate riffles (selected at random) within each reach. Each replicate shall consist of a composite of 3 cross-channel collections made with a D-frame net (25-cm wide over 625-$cm^2$ area and 250-micron mesh size) at one-quarter, one-half, and three-quarters the distance across the riffle transect. Samples will be processed in the field to remove rock and leaf/wood debris, and preserved in ethanol. Sediment and water quality samples will be collected in conjunction with biological sampling.

The Sierra Nevada Aquatic Research Laboratory shall sort, sub-sample, and identify (in laboratory) the invertebrates collected from each site. Lab

sorting and sub-sampling will yield data on taxonomic composition by density and relative abundance. Identification will be to the lowest taxonomic level possible (usually genus, but species when possible based on the availability of taxonomic keys).

## 5.2. Reporting Program

All data collected under this Work Plan shall be retained by the RWQCB in accordance with the provisions specified in the *2003 QAPP for Surface Water Quality Monitoring at Leviathan Mine Superfund Site* (pending). Data from the surface water quality and flow monitoring programs shall be entered into the RWQCB's database for internal uses. In addition, this data will be electronically transmitted to ARC, or their consultants, for placement into the master Leviathan Mine database.

# SITE CONTROL PLAN FOR LEVIATHAN MINE

## 2003 OPERATING SEASON

**May 2003**

***Prepared For:***

**U.S. Environmental Protection Agency – Region IX**
**San Francisco, CA**

***Prepared By:***

**California Regional Water Quality Control Board, Lahontan Region**
**South Lake Tahoe, CA**

## 1. INTRODUCTION

All workers and visitors that enter the Leviathan Mine property during the 2003 operating season (May 1 – November 30) are required to adhere to the provisions specified in this Site Control Plan. The intent of this Plan is to provide a clear set of site requirements to enable the efficient, safe, and coordinated completion of site work.

## 2. BACKGROUND

The State of California acquired Leviathan Mine (the Site) in 1984 in order to cleanup and abate water quality problems caused by historic mining. Historic mining at the Site included both underground and open pit extraction of sulfur. These activities resulted in the exposure of pyrite, contained in the native soil, to air and water. Exposure of pyrite to air and water causes the generation of sulfuric acid, also referred to as acid mine drainage (AMD).

As AMD travels through Site soils, it dissolves and carries metals contained in the native soil. The acidic and metal rich AMD eventually discharges to nearby creeks (Leviathan and Aspen) causing adverse impacts. Aspen Creek flows into Leviathan Creek, Leviathan Creek flows into Bryant Creek, and Bryant Creek flows across the Nevada state line and into the East Fork of the Carson River.

In 1985, working on behalf of the State, the California Regional Water Quality Control Board, Lahontan Region (RWQCB) completed a pollution abatement system at the Site. The 1985 abatement project reduced the volume of AMD generated and discharged from the Site; however, the project did not completely eliminate the discharge of AMD.

On May 11, 2000, the United States Environmental Protection Agency (USEPA) placed the Site on the CERCLA National Priorities List (NPL), thus making Leviathan Mine a Superfund site. CERCLA is a federal law that gives USEPA authority to list sites that may qualify as among the most contaminated sites in the country, and to require responsible parties to respond to a release of hazardous substances.

Because the State is the present owner of the Site, USEPA has identified the State as a Potentially Responsible Party (PRP). Under CERCLA, which is a strict liability statute, the current owner of a Superfund site can be considered a PRP.

USEPA has also identified Atlantic Richfield Company (ARC) as a PRP for the Site, as ARC is the successor to a previous mine owner/operator (Anaconda Minerals). Anaconda conducted the open pit extraction of sulfur ore at the Site.

USEPA will be requiring the State and ARC to carry out removal actions and various remedial activities during the 2003 operating season.

## 3. SITE DESCRIPTION

As part of the State's 1985 pollution abatement project, three major strategies were implemented to reduce pollutant loading to Leviathan Creek, as follows:

- AMD (including flow from a remnant underground tunnel [Adit #5]) were captured and routed to evaporation ponds;
- Leviathan Creek was placed in a concrete channel/pipeline system to prevent direct contact with the acid generating mine wastes;
- and the open pit and other depressions were filled and graded to prevent onsite precipitation from percolating through acid generating mine wastes.

Numerous structures and project components were required to carry out these strategies as shown in Figure 1. The following descriptions will assist in understanding individual project facilities.

a) Flow Control Structure

This concrete structure is located approximately 35 feet east of pond 1. The structure collects acid mine drainage underlying the open pit and from the Adit. The pH of this water is approximately 2. Open pit subsurface drainage enters the Flow Control Structure through an 18" PVC pipe, while Adit flow enters the structure by a 12" PVC pipe.

AMD collected in the Flow Control Structure can be routed to either the evaporation ponds or Leviathan Creek. Two weirs control the direction of flow. Unless the AMD is to be routed intentionally to Leviathan Creek, both weirs should be set below the concrete sills. The weir that opens to the small concrete chamber directs flow to the evaporation ponds via an 18" PVC pipeline. The weir that opens to the large chamber routes flow into the 48" reinforced concrete pipe (RCP) that dumps into the Leviathan Creek Inlet Structure. The primary purpose of this 48" RCP is to route stormwater runoff from the open pit to Leviathan Creek.

b) Distribution Pipeline

AMD collected in the Flow Control Structure is conveyed to the evaporation ponds 1, 2-North, and 2-South via an 18" PVC pipeline that is reduced to 12" at the "T" to pond 1. All these ponds have a butterfly valve that allows for the isolation of any pond. Valves are in manholes marked P1V, and P2V. Distribution 12" PVC pipelines also exist from ponds 1, 2-North, and 2-South to pond 3 and from pond 3 to pond 4.

The distribution line between pond 3 and pond 4 is controlled by 2 butterfly valves. Using these valves, overflow can be routed to either pond 4 or to

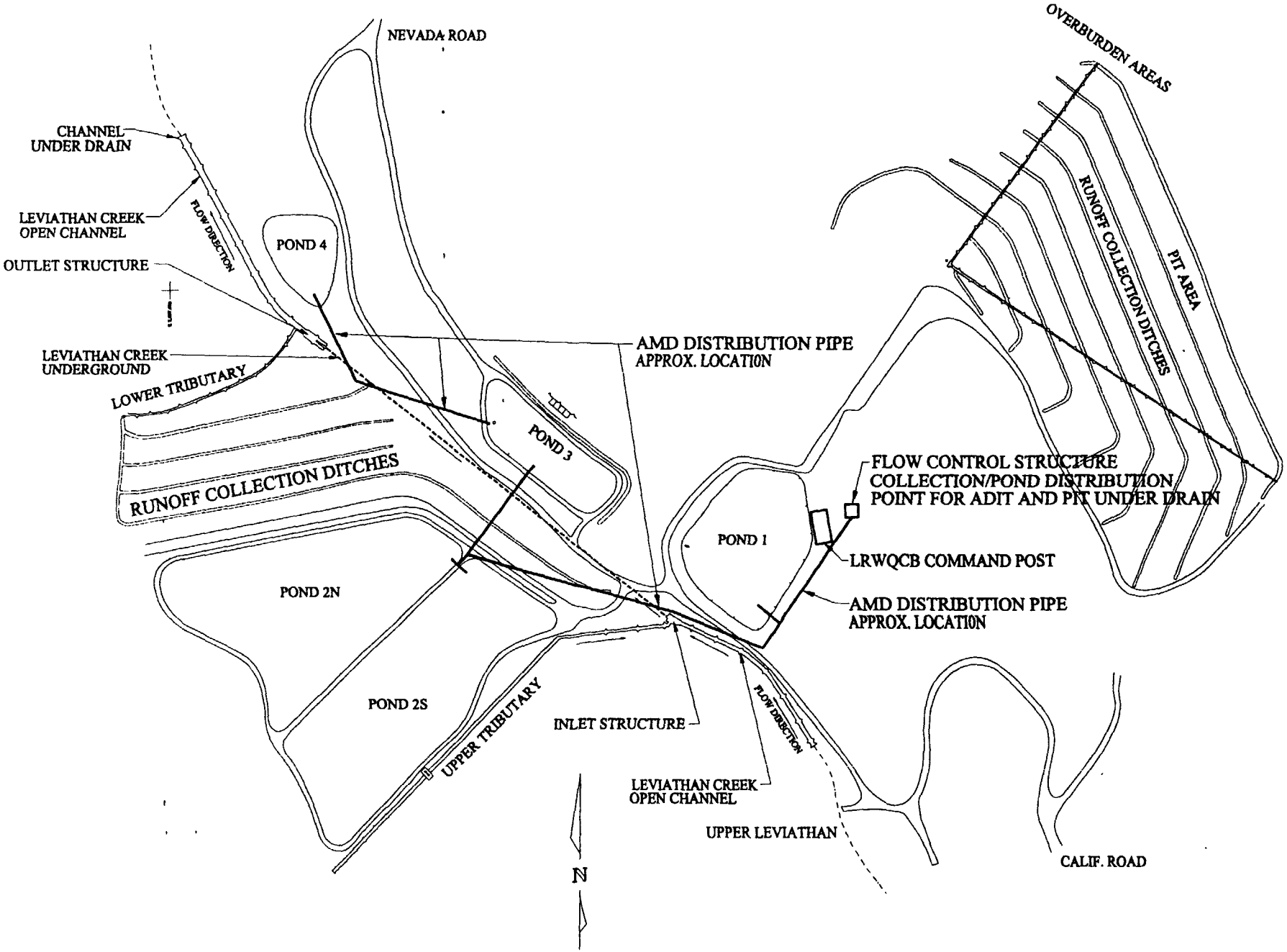


Figure 1. 1985 Pollution Abatement Project

Leviathan Creek via the 72" RCP manhole. These valves are contained in the manhole marked P4V. Three other AMD pipelines were added to the project during the construction phase. These pipelines capture and direct additional AMD to the evaporation ponds. These additions are described below:

At the throat of the open pit starts an 8" PVC pipeline that collects ground water and routes it to pond 3. The 8" line runs along the North side of pond 1, drops down the slope to pond 3 and traverses under the bench between ponds 1 and 3. The 8" PVC pipeline connects to the 12" PVC overflow pipe from pond 1 to pond 3.

Another seep is collected in an 8" PVC pipeline between the P4V manhole and pond 4. Lastly, a small seep east of pond 4 is collected in a 4" PVC pipeline and routed to Pond 4 in a 3" PVC pipe (the exact location of this pipeline is unknown).

c) Evaporation Ponds

The Site currently contains a total of five evaporation ponds comprising approximately 12.8 acres with a cumulative capacity estimated at 16 million gallons (AERL; 1999). Pond designation commences with pond 1 situated at an elevation of approximately 7035 feet above mean sea level and east of Leviathan Creek; pond 2 (consisting of pond 2-South and pond 2-North) situated at the same elevation as pond 1 and west of Leviathan Creek; pond 3 situated at an elevation approximately 50 feet below pond 1 at a location adjacent to the former crushing plant and east of Leviathan Creek; and pond 4 being the lower-most pond situated at an elevation approximately 75 feet below pond 3 and east of Leviathan Creek. Ponds 1, 2-North, and 2-South hold a combined total of approximately 14.7 million gallons of AMD (AERL; 1999). When all the control valves to ponds 1, 2-North, and 2-South are open, the water surface elevation in these ponds should be the same. Ponds 1, 2-North, and 2-South have overflow standpipes which route overflow water to pond 3 via 12" PVC pipelines. Pond 3 overflows to pond 4. If all the ponds are full, pond 4 overflows to Leviathan Creek.

Each pond, except pond 4, has a system to detect leaks in the synthetic pond liners. Gravel fingers exist under the liners that direct any leakage and/or intercepted ground water to monitoring wells. Each pond has one well. Any pond leakage and/or ground water seepage is then routed in an 8" PVC pipeline that connects to each ponds' 12" PVC overflow pipeline.

d) Leviathan Creek Channel

i) Upper Leviathan Creek

An 8' wide reinforced concrete channel collects Leviathan Creek above the Site. The depth of this channel is 4' to 5' throughout most of its length. This channel dumps into the Inlet Structure.

ii) Inlet Structure

This reinforced concrete structure directs Leviathan Creek, the Upper Tributary Channel and open pit stormwater runoff into two 72" reinforced concrete pipelines.

iii) Twin 72" Pipeline

Two 72" reinforced concrete pipelines carry Leviathan Creek down a steep grade. This pipeline exits at the bottom of the grade to the Outlet Structure.

Approximately 10' from the Inlet Structure is the Air Relief Valve. This valve prevents pipeline cavitation during high flows.

iv) Outlet Structure

This reinforced concrete structure is designed to dissipate the energy of the flow exiting the twin 72" pipelines. Flow from the Outlet Structure enters the Lower Leviathan Channel.

v) Lower Leviathan Channel and Channel Underdrain (CUD)

A 14' wide, 9' deep reinforced concrete channel carries Leviathan Creek to its original streambed down-gradient of the mine site.

At the end of the channel extrudes a 12" PVC pipe. This pipeline was used to dewater the foundation of the Lower Leviathan Channel, and is referred to as the CUD. The water flowing from this pipeline is acidic.

e) Surface Water Drainage System

i) Open Pit

Surface water drainage for the open pit consists of small "V" ditches that collect runoff from the open pit slopes. This flow is routed to one of two, 2' wide reinforced concrete channels: Channel A and B. These channels empty into the Junction Box, which is located in the center of the open pit. From the Junction Box, the storm water runoff enters a 42" RCP that flows into the Flow Control Structure east of Pond 1. Storm water leaves the Flow Control Structure in a 48" RCP and eventually dumps into the Inlet Structure. Between the Flow Control Structure and the Inlet Structure there are two manholes, located at pipeline corners. These are designated MH1 and MH2.

ii) Pond 2 Slopes

The graded slopes below Pond 2-North and 2-South are benched with "V" ditches running along each bench. These "V" ditches route runoff to a series of drop inlets that eventually dump into the 72" RCP manhole which discharges to Leviathan Creek. The 72" RCP manhole is approximately 20' deep.

iii) Pond 3 Slope

A single bench exists on the graded slope between Ponds 1 and 3. One drop inlet collects runoff from "V" ditches on this bench. Flow into this drop inlet exits through a 12" PVC pipe that empties into the "V" ditch that circumvents Pond 3.

iv) Upper and Lower Tributary Channels

The Upper and Lower Tributary Channels route stream flow originating offsite and west of the mine property into the Leviathan Creek Channel above and below the 72" RCP pipeline.

f) Pond Water Treatment System

On a seasonal basis, the RWQCB operates a temporary lime treatment system to neutralize AMD held in the evaporation ponds. The treatment system is located on the north east side of pond 1, as shown in Figure 2. The treatment system includes a sludge clarifier located in the mine pit. A complete description of the treatment system is provided in the "*Work Plan for 2003 Site Work by the California Regional Water Quality Control Board, Lahontan Region*". Discharge from the treatment system that complies with USEPA discharge criteria is routed to the Flow Control Structure and exits to the Leviathan Creek Channel via the 48" RCP pipe.

g) CUD and Delta Seep Water Treatment System

ARC will be using the RWQCB's lime neutralization treatment system for purposes of conducting combined flow treatment studies. The details of this project are provided in ARC's 2003 Work Plan for Early Response Actions.

h) Aspen Seep Bioreactor Project

The Aspen Seep is located on the overburden side of the mine, and is a perennial discharge ranging between 8 - 15 gpm to Aspen Creek. ARC will be completing the rebuilding of the Aspen Bioreactor Project initiated during the 2002 field season. Plans for operation and maintenance of the reconstructed Aspen Bioreactor Project during the 2003 field season are included in ARC's 2003 Work Plan for Early Response Actions.

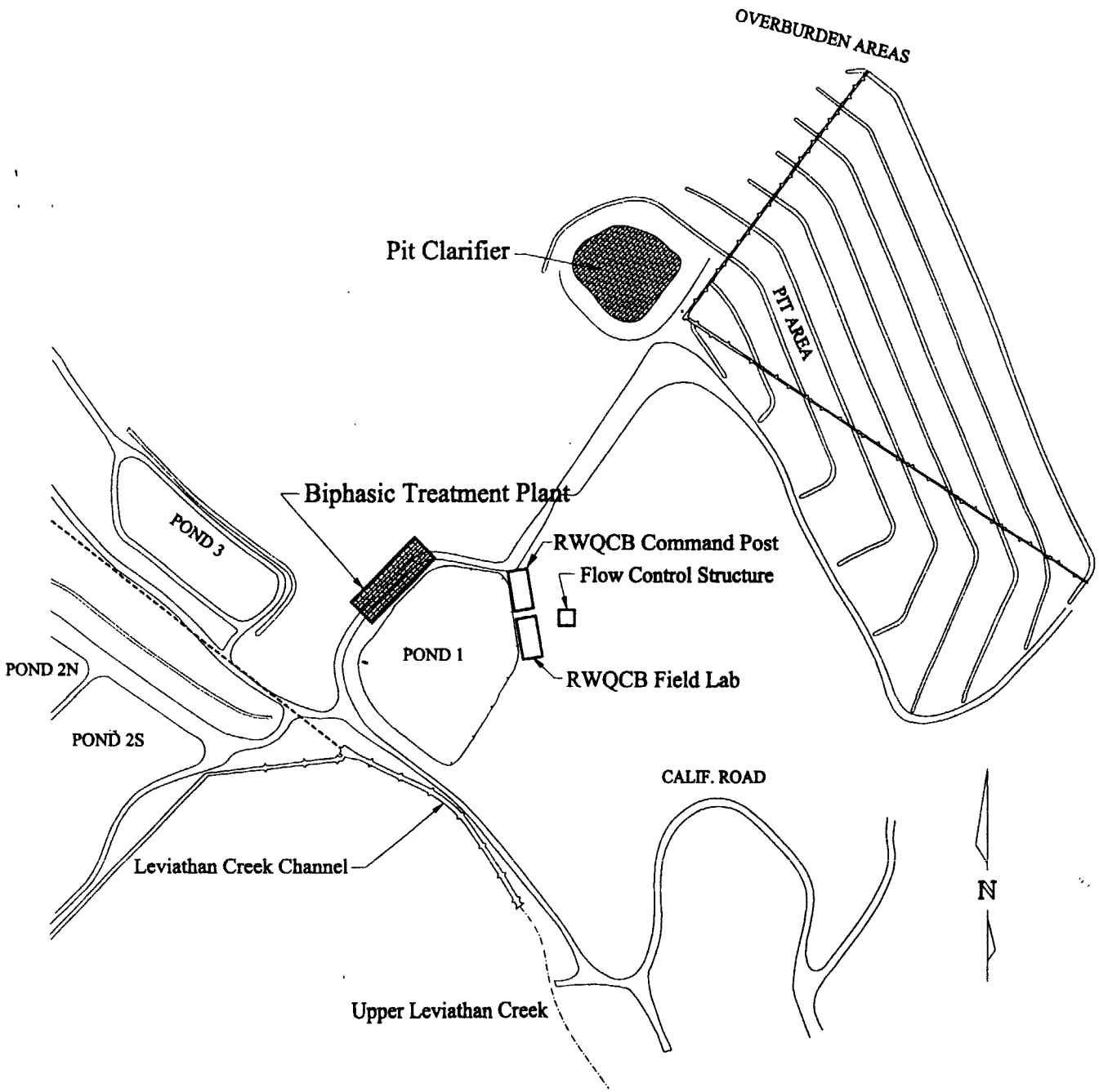


Figure 2. Biphasic Treatment System Location

## 4. PLANNED ACTIVITIES FOR 2003 OPERATING SEASON

a) RWQCB ACTIVITIES

In accordance with directives from USEPA's, the RWQCB will be carrying out the following activities during the 2003 operating season:

i) Pond Water Treatment (biphasic neutralization);

ii) Revegetation;

iii) Site maintenance (removal of sediment from storm water conveyances, fence repair, on and off-site road maintenance, lower Leviathan Creek concrete channel clearing, continuation of a structural assessment of the Leviathan Creek concrete diversion, continuation of Delta Slope stabilization options; design of repairs for repair to pipe penetrations on ponds 1, 2-North, 2-South, and 3); and

iv) Continued implementation of a Site monitoring program.

The above-listed activities will be conducted in accordance with the "*Work Plan for 2003 Site Work by the California Regional Water Quality Control Board, Lahontan Region*", as approved by USEPA.

b) ARC ACTIVITIES

In response to USEPA's Administrative Order for Early Response Actions and Remedial Investigation and Feasibility Study (Docket Number CERCLA 2000-09-05), ARC has prepared an Early Response Action (ERA) Work Plan. This Plan lays out ARC's planned activities for the 2003 operating season, which consists of the following:

i) Treating AMD emanating from the Channel Under Drain (CUD), Delta Seep, Adit, and Pit Under Drain (PUD) via the RWQCB's treatment system located adjacent to pond 1, handling/disposing sludge generated by treatment;

ii) Complete construction of, and continue to operate and maintain the Aspen Bioreactor System.

## 5. COMMUNICATIONS

RWQCB staff has evaluated communications requirements to support implementation of the 2003 site work. Communications requirements fall into two primary categories, as follows:

a) Operational Communications

RWQCB staff and contractors will have direct communications capability via satellite telephones (off-site communication) and hand-held radio units (on-site communication). RWQCB staff's communications capability shall be the primary communications system for all RWQCB administered activities at the Site. However, RWQCB contractors and ARC personnel and their contractors shall be required to provide supplemental communications capability (i.e., satellite phones, etc.) as determined appropriate for coordinating communications directly associated with work aspects related to their contracted activities.

b) Emergency Communication

The following emergency communications protocol has been established:

In the event of an emergency (defined as including by not limited to property damage and/or trespass, personal injury, or fire) related to RWQCB activities, as described above, RWQCB staff (if on-site) or their Contractor will make immediate contact with the dispatch board at the following designated entity:

Alpine County (CA) Sheriff
Post Office Box 278
Markleeville, CA 96120
(530) 694-2231

In the event of an emergency (see above) related to ARC activities, ARC staff (if on-site) or their Contractor will make immediate contact with the Alpine County Sheriff dispatch board, at the above-stated number.

The Alpine County Sheriff has indicated that they will identify the appropriate responder based upon evaluation of the nature and severity of the emergency situation. Medical emergencies will be immediately referred to the Sierra Front Dispatch Center located in Minden, Nevada, where appropriate dispatch will again be dependent on accident severity and required degree of medical care. USFS will be contacted in the event of a spill on or affecting National Forest System land.

**Other emergency phone numbers:**

Carson Valley Medical Center
(775) 782-1500

Barton Memorial Hospital
(530) 541-3420

Washoe Medical Center
(775) 782-1500

## 6. HEALTH & SAFETY (H&S) PLANS

An existing H&S Plan for Leviathan Mine (Site Safety Plan, August 20, 1996) shall govern all aspects of performance relative to RWQCB and ARC personnel and their Contractors. Project specific H&S Plans have been prepared for both the RWQCB and ARC projects. Site workers visitors must adhere to the H&S provisions contained in these plans (including provisions for personal protective equipment).

## 7. KEY PROJECT PERSONNEL

A brief description of the individual entities' roles and principal contacts and/or designees are provided below:

a) U.S. EPA – REGION IX

The EPA designated the following individual from within the Superfund Division as its Project Manager in connection with the 2003 Pond Water Treatment Project:

Kevin Mayer
USEPA
(415) 972-3176

Joel Bauman
Tetra Tech (field representative)
(916) 853-4538

b) RWQCB PROJECT PERSONNEL

The RWQCB has designated the following individuals as the key members of the project team to be associated with the 2003 site activities:

LEVIATHAN PROJECT TEAM:

| Title | Name | Location | Telephone | Pager |
|---|---|---|---|---|
| Project Manager | Chris Stetler | S. Lake Tahoe | (530) 542-5461 | (530) 494-4058 |
| Engineering Geologist | Douglas Carey | S. Lake Tahoe | (530) 542-5468 | (530) 494-8052 |
| Environmental Spec. 1 | Brian Johnson | S. Lake Tahoe | (530) 542-5466 | (530) 494-4113 |
| Environmental Spec. 1 | Laurie Scribe | S. Lake Tahoe | (530) 542-5465 | (530) 494-4524 |
| Sanitary Engr. Assoc. | Robert Tucker | S. Lake Tahoe | (530) 542-5467 | (530) 494-4059 |

c) ARC PROJECT PERSONNEL

Dan Ferriter
ARC
(406) 782-9964 X433

Jesse Fuller
ARC
(406) 491-7131

## 8. SITE CONTROL ACTIVITIES

All workers and visitors that enter the Leviathan Mine property during the 2003 operating season (May 1 – November 30) are required to adhere to the provisions specified in this Site Control Plan. The intent of this Plan is to provide a clear set of site requirements to enable the efficient, safe, and coordinated completion of site work. To prevent the entry of unauthorized personnel onto Leviathan Mine, the main gates to the Site will be closed at all times. In addition, "no trespassing" and "authorized personnel only" signs are posted at the gates.

The following persons have been designated as having primary responsibility for implementation of this Site Control Plan, and for coordinating RWQCB and ARC onsite activities:

RWQCB: Douglas Carey (phone number provided above)

ARC: Jesse Fuller (phone number provided above)

During the operating season, the RWQCB will maintain a command post for RWQCB activities. RWQCB and ARC staff will communicate on a daily basis to ensure that they both have knowledge of the other's planned activities for the day. The RWQCB command post will be located near the Flow Control Structure, on the east bank of Pond 1, as shown in Figure 1. The RWQCB command posts will maintain sign-in/out sheets as record of all site visitors and workers. The sign-in/out sheets will be clearly posted, and will require site visitors and workers to state their onsite activities, time in, and time out. In the event of an emergency, RWQCB staff will be responsible to notify ARC staff, and vice versa. To enhance communication between RWQCB and ARC staff, the onsite leads (see above), have been provided with radios.

Attachment 1(b)

# California Regional Water Quality Control Board
## Lahontan Region

Winston H. Hickox
*Secretary for Environmental Protection*

2501 Lake Tahoe Boulevard, South Lake Tahoe, California 96150
Phone (530) 542-5400 • FAX (530) 544-2271

Gray Davis
*Governor*

July 24, 2003

Mr. Kevin Mayer
United States Environmental Protection Agency, Region IX
75 Hawthorne Street (SFD-7-2)
San Francisco, CA 94105-3901

**WORK PLAN AMENDMENT FOR 2003 SITE WORK BY THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD (RWQCB) AT LEVIATHAN MINE**

On June 6, 2003, the RWQCB transmitted their *Work Plan for 2003 Site Work by the California Regional Water Quality Control Board at Leviathan Mine* (Work Plan) to United States Environmental Protection Agency, Region IX (USEPA). The Work Plan describes pollution abatement work to be carried out by the RWQCB during the 2003 construction season to comply with anticipated USEPA directives (modified Administrative Abatement Action and Removal Action Memorandum).

Due to budgetary constraints and associated contracting delays, the RWQCB is forced to postpone revegetation work outlined in the Work Plan under Section 3.2.1. RWQCB staff anticipate that a contract for this work will be awarded sometime after November 2003 and that the work will be implemented during the 2004 construction season. The revegetation work set forth in Sections 3.2.2 and 3.2.3 of the Work Plan is not effected by budgetary constraints and will occur as scheduled.

We look forward to another successful season at Leviathan Mine, and would appreciate any input you might have with regard to our planned activities. If you have comments or questions, please contact me at (530) 542-5461 or Doug Carey at (530) 542-5468.

Sincerely,

Chris Stetler
Senior Water Resource Control Engineer

cc: Gavin McCabe/ California Attorney General's Office
Joshua Wirtschafter/ USEPA, Region IX
Rob Greenbaum/ Washoe Tribe of California and Nevada
Steve Brooks/ United States Forest Service
Dan Ferriter/ Atlantic Richfield Company

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**REGION 9**

**75 Hawthorne Street**
**San Francisco, CA 94105-3901**

Chris Stetler
California Regional Water Quality Control Board -
Lahontan Region
2501 Lake Tahoe Boulevard
South Lake Tahoe, CA 96150

RE: Approval of 2003 Work Plan for Pollution Abatement Activities at Leviathan Mine

Dear Mr. Stetler,

We have reviewed the LRWQCB's Work Plan for 2003 Site Work at Leviathan Mine submitted to EPA by LRWQCB on June 6, 2003, as amended by the letter dated July 24, 2003. This work on Pond Water Treatment, Site Maintenance, and Site Monitoring represents a continuation of previous years' pollution abatement activities. These plans follow the same general approach and guidelines that met EPA's approval in 2001 and 2002.

The attached review comments were prepared by Tetra Tech for EPA. None of the comments raise concerns that must be addressed before the Regional Board proceeds with this year's activities. The majority of the comments involve monitoring and documentation of the activities to ensure valid quantification of the abatement activities. We feel that these issues should be addressed in reference to the Quality Assurance Plans and can be resolved fairly quickly. I have asked Army Corps of Engineers and Tetra Tech to work directly with Regional Board staff.

The 2003 Work Plans for Pollution Abatement Activities at Leviathan Mine are approved with the comments noted above. We are looking forward to the start of full implementation of the treatment system and the other important site activities. We are optimistic that the Regional Board's work this year will once again result in significant progress toward cleanup at Leviathan Mine.

Sincerely

for Kevin Mayer
Superfund Project Manager

1) Section 2.6.2 Sludge Monitoring Program. This section provides a good description of Phase 1 sludge sampling. However, the description of Phase 2 sludge sampling does not describe whether discrete or composite samples will be analyzed. Nor does the plan identify how many samples of Phase 2 sludge will be analyzed. The plan should provide this information so that the adequacy of the proposed sampling strategy to accurately characterize the Phase 2 sludge can be evaluated.

2) Section 5.1.1.1 Deviations from 2002 Surface Water Monitoring. The plan proposes eliminating lead and selenium from the analytical list this year. Elimination of these two analytes is based on low frequency of detection at limited locations. The plan considers the lead to originate from the adit which is collected in Pond 1 and treated. The plan considers the Se to originate from the pit underdrain or the landslide seep. Selenium from the pit underdrain enters Pond 1 and is treated. Treatment system effluent is analyzed for both lead and selenium.

The plan reports that "almost all instances where Pb was detected the reported concentration was below 0.005 mg/L". This concentration (0.005 mg/L) is the water quality goal from the action memorandum. The reported selenium concentration detected is less than 0.008 mg/L compared to the water quality goal of 0.005 mg/L in the action memorandum.

The plan should be revised to provide the detection frequency and physical-chemical conditions (pH, Eh, SC, flow, season, T) by location associated with detection of lead and selenium to better support the recommendation to eliminate lead and selenium as analytes. In addition, consideration should be given to reducing the number of locations at which these analytes are measured instead of eliminating them from consideration. For example, analyze lead and selenium only at those locations where they have been detected in the past.

3) Section 5.1.1.1 Deviations from 2002 Surface Water Monitoring. The plan proposes eliminating Station 17 (below the confluence of Aspen and Leviathan Creeks) from the current monitoring program. The elimination of Station 17 is proposed based on lack of flow volume measurement at this location, the existing information available from several years of sampling, and continued monitoring at Station 23 (Leviathan Creek above Mountaineer Creek). An evaluation of possible impacts of eliminating Station 17 on assessing the loading of metals to Leviathan Creek should be made prior to elimination of this Station.

The plan also proposes monitoring (metals and flow) at 4L Creek and Aspen Creek above Leviathan Mine. Addition of these stations to the monitoring plan will improve on the ability to assess metals loading to the Leviathan and Mountaineer Creek watersheds.

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 9**
**75 Hawthorne Street**
**San Francisco, CA 94105-3901**

Harold Singer, Executive Director
California Regional Water Quality Control Board -
Lahontan Region
2501 Lake Tahoe Boulevard
South Lake Tahoe, CA 96150

RE: Leviathan Mine: Second Modification to the Administrative Abatement Action of July 19, 2000, CERCLA Docket No. 2003-15

Dear Mr. Singer:

We are pleased to transmit a signed copy of the Third Modification to the Administrative Abatement Action for Leviathan Mine to cover work to be performed in 2003 and a copy of USEPA's Removal Action Memorandum for 2003. These documents reflect the understanding reached between USEPA and the Lahontan Regional Water Quality Control Board for work to be performed by the water board at Leviathan Mine this year. In 2002, the Lahontan Regional Water Quality Control Board, building on its achievements the previous years, successfully prevented overflow from the ponds. Treatment of the acid mine drainage currently in the evaporation ponds will prevent overflow during 2004, and it will provide the capacity for for supporting treatability studies which Atlantic Richfield will conduct this year under EPA direction, thus supporting our assessment for potential long-term treatment technologies.

We appreciate the cooperation between our agencies in responding to the contamination at Leviathan Mine. Your staff have already provided EPA with drafts of the Work Plan specified in this document. We look forward to a successful removal action this summer and future collaboration in long-term cleanup.

Sincerely

Keith Takata

Keith Takata, Director
Superfund Division

Enclosures:
Third Modification to the Administrative Abatement Action of July 19, 2000
Removal Action Memorandum for Leviathan Mine, dated July 28, 2003